DOCUMENT RESUME

ED 231 626 SE 042 061

TITLE	Science Education Newsletter, No. 51.
INSTITUTION	British Council, London (England).
PUB DATE	May 83
NOTE	29p.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Conferences; *Course Descriptions; Curriculum Development; Elementary Secondary Education; Foreign Countries; Higher Education; Instructional Materials; Mathematics Curriculum; *Mathematics Education; Mathematics Instruction; Professional Associations; *Program Descriptions; Publications; Science Curriculum; *Science Education; Science Teaching Centers; *Teacher Education
IDENTIFIERS	Contests; *Great Britain

ABSTRACT

A variety of science and mathematics education activities are reported in two sections. These activities include: conferences (both past and future); innovative projects/programs and initiatives at the primary, secondary, and teacher-education levels; instructional materials development/use; instructional strategies; science education research; science/mathematics education organizations; and others. Twenty-nine separate reports are presented in the first section (Activities in Great Britain). In addition to an annotated list of publications and various program/project descriptions, reports are provided on science in society audio cassettes; girls and physics; school technology/industry videotapes; and a review of secondary mathematics in Scotland. Twenty-seven reports are then provided in the second section (Overseas and International Activities). Among the reports presented are those from Belgium (International Colloquium on Geometry Teaching); Canada (A Study of Science Education); Egypt (Young Scientist's Competition); Lesotho (Bibliography on the Readability of Science Materials and Use of Language); Philippines (Science and Society Curriculum Project); and the United States (National Science Board Commission of Pre-College Education in Mathematics, Science, and Technology). Additional reports in this section are Mathematics Education in the Soviet Union, the International Directory of Mathematical Associations, and the International Journal of Mathematical Education in Science and Technology. (JN)

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Science Education Newsletter

Issued by the
Science, Technology and Education Division
The British Council

ED231626

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May 1983

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Editor's Note

From a desire to give Science Education Newsletter a better balance and a greater geographical representation we would like to extend an invitation to readers, especially from developing countries, to submit items of interest for possible inclusion in future issues.

Our fields of interest are developments and activities in science and mathematics education worldwide; items might include details of conferences (both past and future), journals, innovative projects and national initiatives at the primary, secondary and teacher-education level.

We would like to take this opportunity to thank those people who have brought items to our attention.

Contributions should be addressed to:

The Editor
Science Education Newsletter
W450
The British Council
10 Spring Gardens
London
SW1A 2BN

Activities in Britain

1 Examinations at 16+: Joint Council for National Criteria Recommendations

In 1980 the Government decided that the General Certificate of Education (GCE) O-Level and the Certificate of Secondary Education (CSE) examination systems should be replaced by a single system. The standards of the present O-Level examinations will be safeguarded and the number of syllabuses will be reduced with alternative papers offered at different levels of difficulty (SEN 45:1).

In announcing the scheme the Government stated that 'the present dual system of GCE O-Level and CSE examinations is confusing because there are too many examination boards, too many subjects and too much variation in the content of syllabuses. It is inefficient and wasteful because many pupils enter both examinations in the same subject, sometimes on syllabuses which are widely divergent. The intended equivalence between CSE Grade 1 and GCE O-Level Grades A-C has never been properly understood by employers.'

It had been envisaged that groups of boards would be responsible for producing syllabuses in line with national criteria and schools would still be able to choose examinations set by any of the groups. It seemed likely that there would be mergers between GCE and CSE boards, and groups of examination boards consortia were consequently formed (SEN 47:23) to be represented on a Joint Council for 16+ National Criteria.

The Joint Council for 16+ National Criteria has now submitted the majority of its proposals to the Education Secretary affecting (among other subjects) mathematics, computer studies, biology, chemistry, physics and craft, design and technology. The Department of Education and Science still await proposals for combined sciences. The Joint Council 'has in general attempted to provide guidelines for examinations within which present teaching approaches can continue, so far as they are appropriate to a single system of examining, and which will also be sufficiently flexible to allow new development to take place'. Detailed syllabus content is not laid down nor are rules for methods of assessment, which are to be determined later by the examining groups which will run the 16+.

The Education Secretaries of England and Wales will now consider the criteria and it has been made clear that the 16+ will go ahead only if they are satisfied. This is the first time that Britain has set about the task of drawing up national criteria for twenty subjects.

The following constitute a summary of the educational aims for 16+ courses in the proposals submitted for the various subjects:

Mathematics

- recall, apply and interpret mathematical knowledge in the context of everyday situations
- express mathematical work, including the solution of problems, in a logical and clear form using appropriate symbols and terminology
- organize, interpret and present information accurately in written, tabular, graphical and diagrammatic forms
- perform calculations by suitable methods
- use an electronic calculator
- use contemporary units of measurement
- estimate, approximate and use sensible degrees of accuracy
- recognize patterns and structures in a variety of situations, and form generalizations
- use and manipulate mathematical statements
- recognize and apply spatial relationships in 2- and 3-dimensions
- analyze a problem, then select and apply a suitable technique to obtain its solution
- apply combinations of mathematical skills and techniques in problem-solving
- make logical deductions from given mathematical data
- respond to relatively unstructured situations by translating the problem into an appropriate structured form

The Joint Council has reinforced the points in the Cockcroft Report that 'Pupils must not be required to prepare for examinations which are not suited to their attainment nor must these examinations be of a kind which will undermine the confidence of the pupils'.

Computer Studies

- stimulate and foster an interest in and an enjoyment of the use of computers
- develop confidence and practical skills in the use of computers
- foster an awareness of what characterizes information, information processing, and computer systems
- develop reasoning, judgement and persistence in applying creatively information processing technology to problems which are relevant and worthwhile to the student
- offer a broad and balanced perspective of the range of computer applications in order to provide an understanding of their capabilities and limitations
- develop an awareness of ethical, social, economic and political consequences of the use of computers for individuals, organizations and society through the study of meaningful applications
- develop the ability to communicate and interpret information and concepts relevant to computing using appropriate means.

Biology

- develop a life long interest in and an enjoyment of the study of living organisms
- encourage an attitude of curiosity and scientific enquiry
- develop an ability to solve problems
- develop knowledge and understanding of fundamental biological concepts and principles
- promote an appreciation of the importance and relevance of experimental and investigatory work in the study of Biology
- develop communicative and manipulative skills appropriate to the subject
- promote awareness and an appreciation of the development and significance of Biology in personal, social, economic and technological contexts
- develop a concerned and informed awareness of:
  a) relationships between living organisms
  b) relationships between organisms and their environment
  c) the affect of human activities on these relationships
- promote respect for all forms of life
- provide:

a) a worthwhile educational experience for all
b) a suitable preparation for careers which require a knowledge of Biology
c) a suitable foundation for further studies in Biology and related disciplines.

Chemistry

- stimulate the students and create and sustain their interest in, and enjoyment of, Chemistry
- provide a body of chemical knowledge appropriate for students
  a) not studying the subject beyond this stage;
  b) continuing further studies in Chemistry;
  c) studying other subjects, at the same or different levels;
- lead to an acquisition of knowledge and understanding of chemical patterns and principles
- encourage students to apply their chemical knowledge and understanding to familiar and unfamiliar situations;
  a) make students aware of the importance to scientific method of accurate experimental work
  b) develop students' abilities to perform experiments, having due regard for safety;
  c) develop skills of observation and the ability to record and interpret those observations
  d) develop the process of hypothesis formation and the design of experiments to test these hypotheses;
- develop the abilities to interpret, organize and evaluate data, as part of a problem-solving and decision-making process
- develop the ability to communicate in appropriate ways
- encourage students to appreciate the developing and sometimes transitory nature of chemical knowledge, principles and models
- develop an appreciation of the scientific, social, economic, environmental and technological contributions and applications of Chemistry.

Craft, Design and Technology

- foster awareness, understanding and experitize in those areas of creative thinking which can be expressed and developed through investigation and research, planning, designing, making and evaluating, working with materials and tools
- encourage the acquisition of a body of knowledge applicable to solving practical/technological problems operating through processes of analysis, synthesis and realization
- stimulate the development of a range of communication skills which are central to design, making and evaluation
- stimulate the development of a range of making skills
- encourage students to relate their work, which should demand active and experiential learning based upon the use of materials in practical areas, to their personal interests and abilities
- promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination
- encourage technological awareness, foster attitudes of co-operation and social responsibility, and develop abilities to enhance the quality of the environment
- stimulate the exercising of value judgements of an aesthetic, technical, economic and moral nature.

Physics

The recommendations for Physics, which were submitted much earlier, have already been considered by the Secretary of State for Education but not all met with approval. Replying to the Joint Council he has asked that reference to social and economic issues should be omitted from the physics and other subject criteria. While acknowledging that 'teachers of physics will need to deal with pupils' questions about the social and economic issues which arise from the application of scientific knowledge' the Secretary of State said 'Any references to these issues throughout the statements of criteria might encourage boards to set examination questions which could be answered with little or no knowledge of physics and might make it difficult to avoid tendentiousness in the teaching of science subjects. In the opinion of the Secretary of State these risks, however slight, are best avoided.'

This has created considerable controversy in the science education world and it has been suggested that references by the Secretary of State to social issues and tendentiousness specifically referred to nuclear energy and nuclear arms as well as other controversial scientific issues (eg genetics, pollution). Inevitably this could have implications for the ASE's 'Science in a Social Context' and 'Science in Society' courses which both contain units on the Atomic Bomb and which are both taught to examination level. There may also be implications for the Schools Council-ASE Secondary Science Curriculum Review which has also set out to put science in a wider social context.

The educational aims which had been proposed by the Joint Council were to:

- stimulate and sustain an interest in and enjoyment of physics and its applications
- promote an awareness of the social, economic and environmental implications of physics
- promote an awareness and understanding of the implications of physics
- show that physics is a coherent and developing framework of knowledge based on fundamental theories of the structure and processes of the physical world
- provide a basic knowledge and understanding of the principles and applications of physics which contribute to the quality of life in a technologically-based society
- provide an appropriate body of knowledge, understanding and skills which are suitable for:
  a) those not intending to study the subject beyond 16+ level
  b) those who will undertake further studies in physics
  c) those who will study subjects or take up careers for which a physics background is relevant
- develop the skills of observation, experimentation, processing and interpretation of data, evaluation of evidence and formulation of generalizations and models
- encourage students to apply, qualitatively and quantitatively, their knowledge and understanding of physical principles to familiar and unfamiliar situations
- ensure that students
  a) can follow instructions
  b) understand the need for and comply with safety precautions
- foster relevant communication skills.

2 Assessment of Performance Unit: newsletter

In Spring 1982, seven years after its formation, the Assessment of Performance Unit of the Department of Education and Science printed its first newsletter to complement the various reports it has commissioned and produced in that time.

Issued twice a year the eight-page newsletter provides progress reports on the APU's current activities, organization, conference reports, profiles, and articles relating to published APU reports. It is to be assumed that this newsletter will assist the Assessment of Performance Unit in bringing its full reports to the attention of a wider audience (see SEN 50:19).

For further information and copies of the newsletter write to:

Assessment of Performance Unit
Department of Education and Science
Elizabeth House
York Road
London
SE1 7PH

3 Assessment of Performance Unit: mathematics surveys

The third report in a series which together build up a national picture of the mathematical performance of fifteen year old pupils in England, Wales and Northern Ireland has now been published (*Mathematical Development: Secondary Survey Report Number 3.* Department of Education and Science. HMSO, £6.75. 1982).

The report covers the survey carried out in 1980 and includes some references to the results of similar surveys of eleven year olds carried out earlier. As in all APU surveys, individual pupils, schools or local education authorities are not identified.

The report gives full details of the testing procedures used in the 1980 survey, together with a thorough analysis of the results. Written tests included many of the questions from previous surveys, together with 150 new items. A sub-sample of pupils also took a practical test, and a separate sub-sample completed an attitude questionnaire. A further sub-sample took pilot written tests concerned with problem-solving.

Performance on the written tests is considered against six background variables representing the characteristics of the schools in the sample region of the country, metropolitan or non-metropolitan, size of the age-group, pupil/teacher ratio, take-up of free school meals (a measure of the socio-economic catchment area of the school), and school locality. This is the first survey at secondary level in which more detailed information has been collected about the nature of the catchment area from which pupils are drawn.

Results on items on the written tests are considered alongside analyses of the errors made and the omission and success rates, which provide a clearer picture of some of the factors affecting pupils' performance and an insight into the nature of pupils' understanding of these topics.

The results of the attitude questionnaire show that about three-quarters of pupils considered mathematics to be important both for a career and in everyday life. More girls than boys thought that mathematics was difficult, although it was the boys who tended to over-estimate the ease of individual mathematical problems.

The pattern of performance in the 1980 survey was similar to that observed in the first two secondary surveys. Regional performance was very consistent in nearly all the sub-categories of mathematics tested over the three surveys. Pupils from the South of England achieved the highest mean scores in almost all the sub-categories, whilst pupils from Wales tended to obtain the lowest scores. The Welsh Office commissioned a special supplement to the main report to try to pinpoint in more detail the performance of Welsh pupils.

In all three secondary surveys the mean scores of boys were higher than those of girls in nearly every sub-category. Analyses show that these differences in performance are greatest in the top ten percent attainment band, and that the difference drops steadily down the attainment scale.

This finding on the differential performance of boys and girls accords with that from the primary surveys, which have shown that already at age eleven girls are well behind boys in their performance in mathematics. Only in the more abstract topics, mostly those brought in during the 'modern mathematics' phase, do girls' test scores rival those of boys.

Performance scores for both sexes were highest where the school was based in a non-metropolitan area, where fewer pupils took free school meals and where there were between fifteen and seventeen pupils per teacher.

The APU has now completed its planned series of five annual surveys of the mathematical performance of eleven and fifteen year old pupils, which began in 1978. Annual testing in mathematics has now stopped. It is planned instead to monitor at five yearly intervals from now on.

No separate reports on the surveys carried out in 1981 or 1982 will be published. Instead there will be a retrospective report covering all the surveys. Both age groups (eleven and fifteen) will probably be covered in this same report.

The retrospective report will attempt to evaluate the influences of various background factors on mathematical performance. Work has also begun on assessing trends in performance since 1978, and any evidence on this will be fully discussed in the forthcoming retrospective report.

In summary, the results of the APU mathematics testing so far suggest the following important conclusions, among others:

- practical mathematics tests, one of APU's most significant contributions to mathematical assessment, are now sufficiently well developed to be included in public examinations
- important differences in the scores of boys and girls are already apparent by the age of eleven
- mathematics scores are, on average, much higher in primary schools which set mathematics homework (this is illustrated by the superior mathematical performance of eleven year old children in Northern Ireland, where they do much more homework than their peers in England or Wales)
- most pupils find mathematics easier to do than to explain
- many pupils lack the confidence or experience to use mathematics to solve problems, even when they have mastered the mathematical techniques necessary
- whether the majority get an answer right or wrong can depend as much on the way in which the question is framed as on the mathematics involved.

The complete list of APU Mathematical Development Reports now published, and available from HMSO, is as follows:

- *Mathematical Development Primary Survey Report Number One 1980, £5.00*
- *Mathematical Development Primary Survey Report Number 2, 1981, £5.80*
- *Mathematical Development Primary Survey Report Number 3, 1981, £6.60*
- *Mathematical Development Primary Survey Report Number One (Wales), 1980, £2.50*
- *Mathematical Development Secondary Survey Report Number One, 1980, £6.60*
- *Mathematical Development Secondary Survey Report Number 2, 1981, £6.70*
- *Mathematical Development Secondary Survey Report Number 3, 1982, £6.75*
- *Mathematical Development Secondary Survey Report Number One (Wales), 1982 £3.60.*

4 Annual Conference of the Association of Teachers of Mathematics, 1983

The annual conference of the ATM took place from 5 - 8 April 1983, at Bognor Regis College. As usual, most of the time was devoted to working group sessions, with particular emphasis on in-service training in its many aspects.

5 The Mathematical Association: annual conference 1983

The annual conference of the Mathematical Association took place from 6 - 9 April at the University of Exeter. There were about 400 participants, including some from Belgium, Cameroon, the Federal Republic of Germany, India, Italy, the Republic of South Africa, Switzerland and Zambia.

Most of the major themes considered were those that had been identified in the report of the Cockcroft Committee (see separate article in this issue of SEN). The Association is particularly active in the field of in-service activity in follow-up of the Cockcroft Committee recommendations, through its Diploma courses.

Next year's conference will take place in Manchester, 15 - 18 April 1984.

6 The Cockcroft Report: follow-up activities

The Report of the Committee of Enquiry into the Teaching of Mathematics in Schools (the Cockcroft Report) was published in January 1982. Its contents were summarised in SEN 48:29:1.

The fate of too many reports is to gather dust on shelves. This one is an exception. It received a very warm welcome, both within the teaching profession and within the Department of Education and Science. Thirty-thousand copies of the Report were sold in the year after publication.

In mid-November 1982 the Secretary of State for Education made a lengthy statement in the House of Commons concerning the Government's intentions in response to the Report, and a wide variety of follow-up activities is already under way. These include:

- the first priority is wide dissemination of the Report. National conferences have been held for local education authority mathematics advisers to meet members of the Committee. These were followed by a series of ten regional conferences, organized by Her Majesty's Inspectorate, on an invitation basis. Over 300 other meetings have taken place at which members of the Committee have described their work. Most, though not all, LEAs have organized additional meetings to discuss the Report's implications.
- the Report is well known within the profession, particularly in secondary schools. The DES is producing two further documents, one for primary school teachers, and one for employers. Free copies are available on request to:

  The Publications Centre
  Department of Education and Science
  Elizabeth House
  39 York Road
  London
  SE1 7PH.

- the Government has allocated an additional £7 million for in-service teacher education, of which £2.3 million will be devoted to mathematics. This sum will be used to pay the salaries of replacement teachers for those selected to attend full-time in-service training courses.
- the supply of mathematics teachers will continue to be closely monitored. The situation is improving, and further action will be taken as necessary to ensure an adequate supply of well qualified mathematics teachers. The present exemption from professional training for graduate mathematicians before they are able to teach in schools will cease at the end of 1983.
- the Committee's recommendations for the secondary school mathematics curriculum will be taken as basic criteria for the content and style of the proposed new 16+ examination, which it is proposed will replace the present O-Level GCE and CSE examinations. It is noteworthy that Sir William Cockcroft himself has been appointed Chairman of the new Examinations Council, one of two bodies which is to replace the former Schools Council.
- the Government has allocated £0.5 million to fund a series of feasibility studies on assessment techniques for lower-achieving pupils in mathematics. These studies will be conducted by
  a) The School Mathematics Project in conjunction with Suffolk LEA;
  b) The National Foundation for Educational Research;
  c) The West Sussex Institute of Higher Education.

These feasibility studies will be conducted with a view to developing a system of Graded Tests suitable for those pupils for whom the present GCE O-Level and CSE examinations are too difficult.

Meanwhile, a number of Examination Boards are planning to introduce a series of Graded Tests in mathematics, as a response to the Report's recommendation that pupils should not be faced with examinations on which they can obtain a grade of Pass with a score as low as 30 per cent. These Graded Tests would accordingly cater for pupils in the lower half of the attainment range.

- the Government is also funding a project which will appraise the educational implications of the mathematics testing which has been undertaken in recent years by the Assessment of Performance Unit. This project will be based in Cambridge, and will be directed by Mr D A Quadling OBE, of the Cambridge Institute of Education, assisted by Dr Alan Bishop of the Cambridge Department of Education.

- a further study is being funded by the Government, through the DES, to follow up the Committee's work on the needs of mathematics in employment. This one-year study will assess whether increasing technology in industry is affecting the mathematics needed by school-leaver employees.
- the DES has held a series of meetings with other bodies, including the BBC, the Open University, various curriculum development projects, representatives of the Joint Mathematical Council, examination boards, and so on, to explore appropriate follow-up activities to the Report.
- among other specific follow-up activities have been a series of three BBC television programmes on the Committee's work; this series of programmes has since been repeated by popular request.
- at local education authority level, various LEAs have increased their financial provision for in-service training of mathematics teachers, for the purchase of calculators for secondary schools, for the establishment of mathematics resource centres, and so on.

The two national professional associations of mathematics teachers, the Mathematical Association and the Association of Teachers of Mathematics, have also been deeply involved in follow-up activities. In particular, the Mathematical Association is strengthening its existing in-service Diploma courses for Primary School Mathematics Coordinators and for those concerned with the teaching of mathematics to low attainers in the secondary school, and is establishing a new Diploma course for Heads of Mathematics Departments in secondary schools.

7 A level Mathematics

A joint Mathematical Education Committee of The Royal Society and the Institute of Mathematics and its Applications have published a *memorandum on the reasons in favour of a balanced and coherent structure for A-Level courses and examinations in mathematics.* This pamphlet gives strong support to the recommendations of the Cockcroft report on mathematics at A-Level, as recorded particularly in chapter 11 of the Report.

The memorandum is available on request from:

The Royal Society
Carlton House Terrace
London
SW1.

8 Secondary mathematics in Scotland

Two reports commissioned during the later 1970s by the Scottish Education Department are being taken as the basis for a major restructuring of the secondary school curriculum in Scotland.

The Structure of Curriculum in the 3rd and 4th years of the Scottish Secondary Schools, commonly known as the Munn Report, proposed a core curriculum to be followed by all pupils. This would be based on a minimum of four forty-minute periods per week in each of six basic subjects, with two additional periods for English and one for mathematics. The remainder of the timetable may be used for other subjects at the school's discretion according to the needs of particular groups of pupils.

Assessment for All, commonly referred to as the Dunning Report, considered the problems of assessment of pupils across the whole attainment-range. Based on its recommendations, developmental work is being undertaken to create an examination structure at three levels: Credit, General and Foundation. These three levels are designed to cater for all pupils at the school-leaving level S4 (age 16+). They will replace the present O-Grade, currently taken by roughly two-thirds of Scottish pupils, the exact proportion varying between subjects.

Most of the current development work is concerned with the Foundation level, at which there is least existing experience. It is proposed that much of the assessment at this level should be undertaken by the school internally, with a short external paper to act as a check on standards between schools. At Credit and General levels there will continue to be external examinations.

In mathematics, the first trial examinations are due in May 1985, prior to full-scale introduction a year later. The present experimental work being undertaken in a wide range of schools is concerned with the curriculum and teaching methods as well as with assessment procedures. The principle on which it is based is that the different levels of pupils' attainment in mathematics can be distinguished by the depth and sophistication of their work done on the same topics, rather than there being a need for different syllabuses at different levels. Trial papers are being designed and tested based on this principle. It is interesting to note that the same principle was endorsed, independently, by the Cockcroft Committee in England, in recommending, particularly for slower learners, 'a narrower syllabus and a wider curriculum'.

The changes presently under way are the most significant in the Scottish secondary school curriculum for many years. Further developments will be reported in SEN as they take place during the rest of the present decade.

9 SCOTMATHS

The Second Annual SCOTMATHS Competition took place at Heriot-Watt University, Edinburgh, on 15 December 1982. Teams of four first-year pupils (aged twelve) from each of thirty-four secondary schools in the Lothian Region of Scotland took part. Teams are seated at tables around the perimeter of a large hall. Each team is given the same first question; when it is solved by team discussion, a member of the team runs to the central referees' table to have the answer checked. If the answer is correct the team is given the next question to solve. The winning team is the one which solves correctly the greatest number of problems in forty-five minutes. A team can skip a question if it gets stuck.

Competitors and their supporters – who take full advantage of their being allowed to cheer their teams – are kept up to date with their place on the league table as a computer print-out of results is flashed onto the television monitors in the hall.

The winning team in 1982 came from Dalkeith High School. Further details of the competition may be obtained from:

Mr C J Wood
Schools Liaison Officer
Heriot-Watt University
Chambers Street
Edinburgh
EH1 1HX.

10 The British Society for the Psychology of Learning Mathematics (BSPLM)

The BSPLM brings together those who are concerned with research into mathematical learning at school level. It

organizes occasional day-conferences at different venues in Britain, and an annual residential conference. It also publishes an occasional newsletter.

Membership, which is open to anyone interested in the psychology of learning mathematics, costs £1 per year, payable to BSPLM and sent to:

Dr Celia Hoyles (Treasurer)
BSPLM
Teaching Studies Department
North London Polytechnic
Prince of Wales Road
London
NW5 3LB

The 1983 Annual Conference will take place at St Anne's College, Oxford and the University of Oxford, Department of Educational Studies, 16 - 18 September 1983. Enquiries should be made to:

Mr John Backhouse
Department of Educational Studies
15 Norham Gardens
Oxford
OX2 6PY

11 SMP News

In SEN 46:33:3 we reviewed the SMP 'Individualised Mathematics' books on the basis of those which were available at this time. Since then more titles have been printed giving the current situation as follows:

Computation and Graphs	£2.80
Probability and Statistics	£2.80
Algebra 1: Language and Structure	£2.80
Algebra 2: Equations, Formulas and Graphs	£2.80
Matrix Algebra and Isometric Transformations	£2.80
Further Algebra and Computation	
Further Matrices and Transformations	£3.50
Geometry 1: Symmetry and Trignometry	£2.80
Geometry 2: Shapes and Similarity	£2.80
Geometry 3: 3 Dimensions	£2.95

All of these books are published by the Cambridge University Press.

12 The Mathematical Association: posters and postcards

Responding to the challenge of the Cockcroft Report to use display material as 'a valuable resource for teaching whose use should not be underestimated' the Mathematical Association has now produced a set of six posters and sixteen postcards.

The titles of the posters are:

The Mobius Band
Euler Solids
Archimedes
Tricky Sum
Tangram Tree
Puzzlement

The sixteen postcards (puzzlecards) provide sixteen teasing problems, and are supplemented by a solutions leaflet.

The cost of a set of six posters including p. and p. is £7.00 (UK) or £8.30 (overseas).

The cost of a set of sixteen postcards including p. and p. is £2.70 (UK) or £3.00 (overseas).

Requests for further information or orders (with enclosed cheque/money order) should be addressed to:

The Mathematical Association
259 London Road
Leicester
LE2 3BE

13 Microelectronics Education Programme: extension

The Department of Education and Science has recently announced that the Microelectronics Education Programme (see SEN 50:11 and 49:8) is to run for an extra two years until 31 March 1986 at an extra cost of £9 million. This would bring the total amount spent by the Government since the Programme began in 1980 to over £20 million.

Speaking at an MEP Electronics and Control Technology Presentation in Birmingham the junior Education Secretary, Mr William Shelton, said that the Programme was acting as an important agent in establishing the effective use of microcomputers in schools.

As well as highlighting the MEP's achievements in curriculum development and teacher training he stressed the continued need for innovation and keeping pace with the rapid changes and developments in new technology, particularly insofar as monitoring software requirements is concerned.

MEP software and related items are available to schools at a subsidized price but are now becoming increasingly available as export commodities. MEP is also receiving a steady stream of interested visitors from overseas and the potential for overseas consultancy services is considerable.

The Microelectronics Education Programme was originally announced on 4 March 1980. Its Director, Richard Fothergill, and his headquarters team are based in Newcastle-upon-Tyne, and there are fourteen regional information centres around the country (twelve in England and one each in Wales and Northern Ireland).

For further information on the MEP write to:

MEP
Cheviot House
Coach Lane Campus
Newcastle
NE7 7XA

14 Starting Microelectronics: curriculum development project

At the Middlesex Science and Technology Education Centre (the SATRO based at Middlesex Polytechnic), microelectronics and its introduction into the secondary school curriculum has been the subject of considerable discussion with the conclusion reached that microelectronics should feature as part of the curriculum of all pupils.

Subsequently, in 1979, a group of teachers with a grant from the Department of Industry set about producing a course which would enable all third-year pupils (fourteen-fifteen years age range) to experience the excitement of microelectronics and demonstrate that the principles involved were relatively simple. The result was 'Starting Microelectronics'.

'Starting Microelectronics' is divided into four phases:

Phase 1: pupils are immediately involved as they build a series of increasingly complex radio circuits, using prototype boards and other components which are introduced and explained one at a time

Phase 2: the emphasis shifts to timing circuits, based on the Schmitt Trigger; pupils build oscillators, counters, organs and warning lights

Phase 3: introduces logic states and truth tables. In a step-by-step approach four-bit binary counters are produced; specially designed decoder/counter printed circuit boards are used to display the output of the binary counters

Phase 4: pupils move into a range of projects based on the counting and timing of laps of a racing car.

The course underwent initial trials in four schools in 1980/81, and complete trials in twenty-three schools in 1981/82. The designers feel their objectives have been achieved and point to a significant increase in pupils opting for physical science for 16+ examinations.

'Starting Microelectronics' is being made available to a further 200 schools in 1983. The complete package designed for a class set of thirty-two pupils working in pairs, consists of prototype boards, ICs and other components, batteries, wires, connectors, tools, pupil texts and teacher's guide together with twenty-eight assembled printed circuit boards. The total cost is £500.

Further information from:

Middlesex Science and Technology Education Centre
Middlesex Polytechnic
Trent Park
Cockfosters Road
Barnet
Hertfordshire
EN4 0DT

15 Central Program Exchange: Wolverhampton Polytechnic

In SEN 39:15 we gave a résumé of the work of the Central Program Exchange which is an organization concerned with the transferability and implementation of computer programs at reasonable cost within the secondary and post-secondary educational spheres. Since then the CPE, which has several international members and is based at the Polytechnic, Wolverhampton, has increased its resources and has been rapidly expanding its library of over 300 programs, written by teachers throughout the world. Under their low-cost membership scheme (£10 per year or £20 if outside Europe) you would be offered:

- up to ten programs per year as listings or paper tapes, chosen from any section of the CPE catalogue. Programs cover the areas of Utility Programs, Programming Systems, Data Handling, Mathematics/Statistics/Arithmetic, Management Sciences, Sciences, Geography, Administration, Social Studies, Computer Science, Engineering, Demonstration, Languages, General and Programming Languages
- extra programs at a fixed cost of £2 per copy
- copies of the CPE catalogue and newsletters as they are published
- cassette versions of programs as available at a small extra cost. Some small programs will be available on cassettes suitable for TRS 80 users shortly, and the range will hopefully be extended to other microcomputers in due course
- for each program the CPE accepts from you (assuming that it meets their standards) you would be entitled to select up to three extra programs

FORTRAN, ALGOL and BASIC are permitted as programming languages.

One of the conditions of membership is to agree to use CPE programs only for personal/institutional use and not to infringe any copyright conditions.

The CPE has also produced a book entitled *Computer Resources for Education and Training: Volume 1* (cost £3.50) which contains descriptive write-ups of a number of well tried and tested programs which are suitable for use in schools and colleges. This book is the first of an intended series to be published by the CPE which is directed by A J Powell. For further information/resources/programming details write to:

Mrs J Brown
Administrative Assistant
Central Program Exchange
Department of Computing and Mathematical Sciences
The Polytechnic
Wolverhampton
WV1 1LY

16 Microcomputing for the More Advanced: Mathematical Association seminar, 1983

The aim of this seminar which will take place at Sherborne School, Dorset from 2 - 4 September is to look at the use of microcomputers in the teaching of mathematics. It is expected that all course members will have had experience of teaching (or are capable of teaching) at least up to O-level and hopefully to a A-level, in computer studies.

The cost is £45 (residential) or £30 (non-residential). These fees include all seminar fees, full board and all meals for residential members and all meals, except breakfast, for non-residential members. Further details are available from:

G J Fowler
21 Sheffield Road
Boldmere
Sutton Coalfield
West Midlands
B73 5HA

17 'Technology': a definition

Given the wide range of activities that the word 'technology' conjures up it is not surprising that people have been reluctant to commit themselves to a definitive statement of what technology is, although no one disagrees that an attempt at definition would be desirable. In our article on *'Technology in Schools'* (SEN 49:20) we mentioned that 'two-thirds of the schools visited by HMI had no written definition of technology in schemes of work or syllabuses and although CSE syllabuses usually contained a definition it was rare for a GCE syllabus to do so'.

Rather than a terse definition the Committee on Technology of the Consultative Committee on the Curriculum of the Scottish Education Department has accepted an 'explanation' of technology taken from the East Anglian Examination Board and earlier quoted in *'Technology in Schools'*:

> 'Technology is concerned with the identification of the needs of man and the endeavour to satisfy those needs by the application of science and use of materials, resources and energy. It is concerned with solving problems where there is no right or wrong answer, only good or bad solutions to a problem. Technological behaviour requires activities that are creative and

demanding, where the laws and principles of science, the constraints of society and economics are applied to problems of satisfying human needs. Technological behaviour involves approaches and techniques such as system analysis, problem identification, decision making, planning, idea communication and solution evaluation, that are more than pure science or craft.'

18 School Technology/Industry: videotapes

In recent years the National Centre for School Technology has increasingly used its resources to promote School/Industry links and to encourage cooperation of all kinds. A new development has been the production of a range of low-budget colour video material, financed by the Industry/Education Unit of the Department of Industry.

In Industry recordings have been made to illustrate:

- the increasing use of advanced technology by industry, particularly in the field of control and materials handling
- specific engineering applications of mechanical, pneumatics and electronic principles already introduced in appropriate school courses
- the urgent need for an adequate supply of entrants to industry, at all levels, with the potential to meet the technological requirements of the 1980s and 1990s.

In Schools recordings have been made to show:

- evidence from firmly established school courses, eg Control Technology which provides clear information on the background, aims and objectives, and the key factors in promoting new examination courses in Applied Science and Technology
- examples of day to day teaching and 'in-class' activities to demonstrate their relevance to industrial applications in electronics, pneumatics and mechanisms etc
- examples of direct industry/school cooperation, including: financial sponsorship; 'adoption' of schools by companies; contributions to schools by qualified engineers.

Copies of these first colour videotapes are now available on loan to UK schools and colleges, initially on VHS format though other formats will be considered according to demand.
The tapes are likely to be an effective method of providing information and background on relevant curriculum developments, and to enrich existing school courses. Further information is available from:

The Director
National Centre for School Technology
Trent Polytechnic
Burton Street
Nottingham
NG1 4BU

19 Applications of Science and Mathematics to Industry and Technology (ASMIT)

In SEN 41:6 we noted the availability of note-cards on the 'Applications of Science and Mathematics to Industry and Technology'. These have now been amended and extended to cover approximately 100 applications and are now available (cost £5.00) from:

Association for Science Education
College Lane
Hatfield
Hertfordshire AL10 9AA

20 Industry-Education Links: University of Bath

The School of Education, University of Bath has been working closely with industry for a number of years in industry/education related problems.

The nature of this cooperation is two fold. Firstly, many industrial and commercial enterprises produce teaching and learning materials for schools. These may be either mainstream or supplementary materials, and generally provide resources for curriculum areas closely related to the parent company. One aspect of the work at Bath is to help the development and evaluation of such materials through writing and testing procedures.

The second aspect of the work relates to the solution of training problems in the industry itself. Here the skill and expertize of professional educators is sought to help the development and evaluation of training programmes and resources, and can often lead to contracted research and development projects. One such project at Bath has comprised the development of in-service distance learning materials for oil company personnel. Applied research of this nature, contracted by the University, can be of great practical, financial and academic value.

A particularly important outcome of each project is the building of bridges and mutual understanding between the realms of industry and education. Thus a distinct but related venture, stemming from such cooperation, has been the development of an industrial experience course for student teachers during their initial training period. The commissioned and contracted research work in Education in the University is directed and coordinated by Dr Eon Harper, Director of Studies for External Relations, to whom further enquiries may be made at:

School of Education
University of Bath
Claverton Down
Bath
BA2 7AY

21 Second Annual Schools Science, Technology and Drama Competition, 1982

This competition, which first ran in 1981, invites children from junior, middle or secondary schools to devise and give a theatrical presentation along one of three general themes:

- an episode from the history of science, technology or engineering
- a contemporary, controversial issue related to the social consequences of developments in science and technology, or
- the exposition of a scientific concept in a way that facilitates its understanding

Entries could be made in two sections; either as groups of middle/secondary school children or as groups of junior school children.

The presentation could take any form such as drama, mime, dance etc and could include the projection of slides, film or video recordings. In October judges visited individual schools to make preliminary assessments of the presentations with a view to consideration for the finals which took place at the Sherman Theatre, Cardiff on 22 November. For an entry to be considered for the final the performance should last between 15 - 20 minutes. Entries would be judged on the scientific correctness and effectiveness of the presentations. The entries chosen for the 1982 final were:

'Metamorphoses':	a dance drama illustrating the compatability between Darwinism and Christianity, with songs and drama linked by narrative.
'Blood, Blood, Glorious Blood':	a presentation involving music and dance to explain particular functions of the blood.
'Models of the Atom':	a dance presentation demonstrating historically important models of the atom.
'Who will Remember?':	a play centred on the invention of the miner's safety lamp by Sir Humphrey Davy.

The competition is organized by the Science, Mathematics and Technology Centre at University College, Cardiff. Further information may be acquired from:

Professor J Beetlestone
Department of Education
University College
Senghennydd Road
Cardiff
CF2 4AG

22 Girls and Physics: report

In the topical field of girls and science a new report, produced by the joint Physics Education Committee of the Royal Society and the Institute of Physics, has recently been issued under the title, *Girls and Physics*.

The introduction of this thirty-two page document comments that over the last two decades, despite much research, the position of girls in science education is still causing great concern. Of the various sciences the one most neglected is physics, which has such significant relevance to careers in technology and engineering.

The only term of reference of the working party was to report on 'the lack of girls studying physical sciences' and this was interpreted liberally. Having no resources to carry out detailed investigations of its own the working party confined itself to:

- gathering the facts of the situation insofar as these were available
- summarizing the various theories and conjectures as to why girls turn away from the physical sciences
- recommending corrective courses of action at the school, LEA and national levels

Their findings are included in the report a copy of which can be obtained by writing to:

Mrs S Saville
The Education Officer
Institute of Physics
47 Belgrave Square
London
SW1X 8QV

23 Science in Society: audio cassettes

As an extension to existing materials (SEN 48:26 and 45:30:7) the Science in Society Project has produced units of fifteen-minute audio programmes designed for use in the classroom to stimulate and initiate discussion of important issues.

Each unit comprises four programmes on two cassettes, boxed and accompanied by a set of Teachers Notes on the suggested use of the cassettes. The titles of the units are:

Unit 1: Health, Medicine and Drugs
Unit 2: Food for a Growing Population
Unit 3: Energy Today and in the Future
Unit 4: Resources in a Finite World
Unit 5: Industry
Unit 6: Science, Technology and People
Unit 7: Quality of Life and the Future

Each unit costs £8.60 (exclusive of VAT, postage and packing). Further enquiries and orders should be addressed to:

Science in Society Audio Ltd
218 Sussex Gardens
London
W2 3UD

24 Diploma in Primary Science Education: University of London Institute of Education

This new diploma course will start in September/October 1983 at the University of London Institute of Education.

Duration

Two years part-time or one year full-time.

Participants

This course will be suitable for teachers concerned with developing and teaching science programmes in primary schools and for those who are helping other colleagues to teach science.

Several staff in ULIE's Science Department have worked overseas and the full-time course will be available to overseas students as well as UK students.

Entry Qualifications

A teaching qualification and three years teaching experience. Previous science qualifications are desirable but not essential.

Assessment

Students will be required to:

- plan and prepare teaching materials for primary science
- use the materials in schools
- evaluate the materials
- assess the progress of pupils.

A full report is submitted by the end of May in the final year.

Students sit two examinations (one practical) which will test knowledge of science and practical skills. Students must submit two course work assignments – 2000 word essays or equivalent.

Background to the Course

Science in primary schools has been discussed for the last two decades but it appears that many teachers still do not exploit this promising area. The diploma course is designed to give the confidence and skills to develop science teaching in primary schools, and to evaluate its contribution to the curriculum.

Teachers are understandably reluctant to include science in their lessons when they doubt the level of their own scientific knowledge. The course organizers suggest that the knowledge required in primary school science is not large in terms of science content, but must be sound enough to give reasonable confidence, and broad enough to cope with childrens questions. There will be a significant science component to enable participants to update and extend their knowledge, to develop skills

of observation, to assess the role of experiments, to appreciate the value of open-ended questioning and to recognize that the natural world provides an ample resource. In particular suggestions will be made for using these natural resources and participants will share experiences of trying out and developing these ideas.

Because there will always be a need to develop further the knowledge of ways in which children form concepts and the language they use to articulate their ideas, participants will be helped to act as researchers, to observe pupils and report findings. They will also be required to evaluate the courses they set up in their schools and will be encouraged and helped to develop their own appropriate methods.

Teachers need adequate 'maps' of the contributions which science can make in primary schools; of how it should relate to the curriculum of secondary schools and of how it must be matched to pupils abilities. Development of these 'maps' will form a part of the course.

For further details write to:

The Academic Registrar
University of London
Institute of Education
20 Bedford Way
London
WC1H 0AL.

25 Centre for Studies in Science Education, Leeds: courses

The Centre for Studies in Science Education, which is the source of a number of important publications including the annual journal *Studies in Science Education* (SEN 50:28), has enjoyed a high reputation both nationally and internationally for its work in science and mathematics education.

The Centre provides the following full-time courses and facilities which are likely to be of interest to students from overseas:

Taught Diploma Course (one year)

- Diploma in Computers in Education
- Diploma in the Teaching of Mathematics (Middle Years of Schooling)
- Diploma in the Assessment of Educational Performance.

Taught MA Course (one year)

Students follow three courses chosen from the list below and in addition prepare a research exercise/extended essay upon an agreed topic:

- Assessment
- Comparative Education
- Curriculum Theory
- Curriculum Theory (Science)
- Education Administration
- Educational Psychology
- History of Education
- Management of Education in Developing Countries
- Mathematical Education
- Philosophy of Education
- Research Methods and Experimental Design
- Science Education in its Social Context
- Sociology of Education
- The Learning of Science and Mathematics
- The Teaching of Intellectual Skills
- Theory of Education
- The Emergence of Modern Scientific Thought
- Issues in the Historical Interpretation of Science
- Special Subject in Philosophy of Science
- Special Subject in Social Aspects of Science.

Research Degrees

- MEd (one year)
- MPhil (at least two years)
- PhD (at least three years)

Further enquiries should be addressed to:

The Director
Centre for Studies in Science Education
University of Leeds
Leeds
LS2 9JT.

26 British Association for the Advancement of Science: junior award scheme

The British Association for the Advancement of Science has recently backed a junior award scheme which has just completed a pilot run in a few schools in Britain.

One such school involved in the pilot scheme was Lowton High School. Arrangements were made for the 10 - 11 year old pupils from Lowton High's 'feeder' primary schools to learn chemistry, physics and biology in the year before they started at the higher school.

In the first term (beginning September 1981) pupils attended a course for half an hour a week for ten weeks under the supervision of two science teachers, successfully completing a series of ten experiments leading to a one-star award at Christmas. In the spring term the course was expanded to three days a week, bringing in another science teacher and more pupils (ie a different set of pupils were taught on each of the three days) and by Easter, ninety pupils had successfully completed the one-star award.

The first two-star award course was held during the summer term, involving fifty-five pupils although unfortunately, it was impossible to accommodate all of those who had wished to attend.

The majority of the pupils involved in the scheme joined Lowton High School in September 1982 and some of them have been involved in project work to achieve their three-star award.

The school year beginning in September 1982 also saw the extension of the award scheme to more pupils in the junior schools and plans are now under way for pupils to take the one-star award in the penultimate year of junior school prior to going to the higher school.

The educational significance of this scheme seems to lie in the contact between the specialist secondary staff and the primary schools, and it is hoped that this scheme will soon be implemented on a national scale.

27 The Council for Environmental Education: research

The Council for Environmental Education (CEE) is currently in the throes of compiling a dossier of references to research undertaken into whether field courses actually influence attitudes to the environment and whether formal environmental education achieves any substantial change in attitudes to the environment and perception of the environment.

There is apparently a great lack of research information in this important area and the CEE has extended an invitation to any individual/organization which can supply relevant sources of information, contacts, etc to write to them with the details.

Additionally the CEE is also prepared to forward such references to a researcher currently involved in this aspect of environmental education. Information should be sent to/requested from:

The Council for Environmental Education
School of Education
Reading University
London Road
Reading
Berkshire
RG1 5AQ

28 The Institute of Biology

The Institute of Biology has recently moved premises. It now operates from the following address:

20 Queensberry Place
London
SW7 2DZ

29 PUBLICATIONS

29.1 SMP 11 - 16 published by Cambridge University Press

The School Mathematics Project (SMP) is developing a major new course for the main secondary stage, ages 11 - 16. The developmental process is following the well-established pattern. Draft material is written by a team of experienced teacher-authors, and tested in schools. As a result of comments and criticisms, material is revised before publication. Testing started in September 1980 at the Form 1 level and the revised Form 1 material was published early in 1983. Material for successive school years will follow at annual intervals. The course is in two parts:

1. a booklet-based scheme for the first two years (11 - 13);
2. a book-based scheme for the last three years (13 - 16).

Material for the first two years is centred on sixteen- and eight-page booklets organized in four successive levels, Levels 1 - 4. Pupils need a satisfactory understanding of one Level's work before proceeding to the next, although the levels are not linked to chronological age. Within a Level, booklets do not have to be tackled in a single predetermined sequence. They are designed to enable pupils to work from them directly at their own pace, though they also provide scope for group work and teacher-led class activity. Classes using them may be either set or mixed-ability. Extension booklets are included for the more able pupils.

From the third to the fifth years, the material takes the form of three parallel sets of five books. The Y (yellow) books are intended to lead to an O-Level or equivalent examination, the B (blue) books are for the middle-ability pupils, while the G (green) books are designed for those who in the English system may not take any public examination. In this way SMP 11 - 16 seeks to cater for all but the lowest fifteen per cent of the mathematical ability range.

Early reports from testing schools indicate that the new course is likely to be very successful, particularly in its providing appropriate work, in both content and in style, for this very wide range of pupil ability. Level 1 and 2 material is already available. Full details and prices, together with details of future publication plans, may be obtained from:

Cambridge University Press
(attention: Mr A L Davies)
The Edinburgh Building
Shaftesbury Road
Cambridge
CB2 2RU

29.2 Integrated Mathematics Scheme published by Bell and Hyman

The nature and structure of this major new secondary mathematics scheme was described in SEN 48:29:3. The following additional books in the series are now available:

Pupils Book A2.	P Kaner.	1982 at £ 3.95
Pupils Book B2.	P Kaner.	1982 at £ 3.95
Book C.	W W Sawyer.	1982 at £ 4.95
Teacher's Book 1.	P Kaner.	1982 at £ 3.50
Teacher's Book 2.	P Kaner.	1982 at £ 3.50
Spiritmasters 2.	P Kaner.	1982 at £14.00

The A series of pupils' books are intended for most pupils, so *Book A2* is the basic text for second-year secondary pupils. *Book B2* contains more demanding work on the same topics, and is designed for the more able pupils. Each year has a Teacher's Book which provides teaching ideas and full answers to both the A and B texts.

Teacher's Book 1 starts with a thorough description of how the whole rather complicated scheme works. This complexity reflects the enormous demands placed on teachers of full mixed-ability classes in a comprehensive school. In a selective educational system, or in a school where mathematics is setted from the beginning of the secondary stage, the appropriate sequence of texts could be extracted from the whole scheme. In any situation in which IMS is to be used, however, it is essential for pupils to have access to calculators. These are taken to be the basic computational aid, and as such the series is one of the most forward-looking on the market.

Book C is known as 'the book of difficult problems'. It is a collection of problem-situations designed to stimulate and challenge the most able pupils in the 11 - 13 age range. It will prove addictive to many of their seniors, including teachers!

At the other end of the ability range, the material takes the form of Spiritmasters, one book for each of the first two years. The technique allows the production of multiple copies of worksheets without the use of any machinery, though a duplicator speeds the process up. This format allows material to be given to the slowest learners in quantities and frequencies which will not prove as daunting for them as being faced by a whole textbook.

29.3 Low Attainers in Mathematics 5 - 16: policies and practices in schools by B Denvir, C Stoz and M Brown (Schools Council Working Paper 72) published by Methuen Educational, 1982, at £5.50

The Schools Council Low Attainers in Mathematics Project ran from 1978 to 1980. The Project worked in two areas:

- bring to the notice of teachers current knowledge about learning processes in Mathematics
- provide information to teachers and advisers about the ways in which primary, middle and secondary schools deal with pupils who have difficulties in Mathematics.

The findings in the first area will be published shortly (Holt, Rinehart and Winston, 1983). It will describe

and review research which relates to the teaching of Mathematics to low attainers and the difficulties which such children have in learning the subject.

The book under review is the outcome of the Project's work under the second heading. It is based on close study of how a variety of schools attempt to tackle the problem of teaching low attainers, who are defined as those who fall, for whatever reason, into the lowest twenty per cent of mathematical attainment in their age group. Each chapter deals with a different aspect of the problem:

- Who are the low attainers in Mathematics?
- Aims and policies
- Learning and teaching
- Curriculum and materials
- Organization
- Assessment and recording
- Making improvements
- Future needs.

The authors include a great deal of interesting detail about individual students and many examples of classroom work. Each chapter includes 'points for discussion' to assist teachers in applying the ideas to their own particular situation.

The problem of low attainment is probably more acute in Mathematics than in any other subject. It is one of the main problems faced by Mathematics teachers in any country in which education is compulsory, even if only at primary level. When a new stage of education becomes compulsory (eg UPE in several African countries, or lower secondary education in Malaysia), teachers are faced in their classes for the first time with a substantial number of low attainers. This book should help them. Although the detail is specific to England and Wales, the principles are more widely applicable. It is particularly helpful to have thirteen 'features contributing to success' summarized in an appendix.

This book makes one thing abundantly clear, if further proof was needed – that in a system of universal education, it is absurd to impose a common Mathematics curriculum on all children. To do so serves neither the interests of the children themselves nor of the country of which they will become citizens.

29.4 Helping Mathematically Able Children: A Practical Guide to Resources by Peter J Congdon, published by GCIC, 1983 at £1.70

This little booklet contains lists of resources (mainly British) available to help teachers to provide appropriate materials and activities for mathematically able pupils. These resources include books, teaching materials, games and puzzles, contests and competitions, addresses of relevant professional associations, subjects for further discussion, and suggested activities.

The publication is likely to prove a valuable reference book to all mathematics teachers, even to those who are not aware that they have mathematically gifted pupils in their classes. It is available from:

Gifted Children's Information Centre
'Hampton Grange'
21 Hampton Lane
Solihull
West Midlands
B91 2QJ.

29.5 Mathematics for Gifted Pupils by Anita Straker, published by Longman for Schools Council, 1983 at £2.95

It is the pupils at the extreme ends of the ability range who often present teachers with the greatest challenge. This book, a product of Schools Council Programme 4, on 'Individual Pupils', provides much valuable help in making appropriate provision for the mathematical needs of the most able.

Such pupils are not necessarily those who obtain the highest marks in routine classroom work. Some able pupils consistently under-achieve, either through boredom or for social reasons. A principle that emerges from this book is that the best way to identify the highly gifted is to make appropriate stimulating material available to a wide range of pupils; those with the greatest mathematical potential will then identify themselves by their response to it.

The book provides very many practical ideas for the teacher who wishes to provide materials and activities suitable for such pupils, both within timetabled lessons and in out-of-school time. Its most valuable feature is a very comprehensive list of resources, including books, magazines, films, sources of puzzles, competitions, calculator and microcomputer material, and further references and addresses. Although many of these are British, some of the items are likely to be available and of relevance in all countries. Altogether this is an excellent publication.

29.6 Continuing Mathematics by W M Hawthorne and A A Olubummo, published by Evans, 1982

Student's Books 1, 2, 3. at £2.05, £2.20, £2.35
Teacher's Books 1, 2, 3. at £3.25, £3.40, £3.75
Practice Books 1, 2, 3. (available in Nigeria only)

Nigeria is one of a number of African countries that have in recent years adopted a national syllabus for school mathematics that attempts to combine the best of 'modern mathematics' (eg statistical ideas) with the best of 'traditional mathematics' (eg confidence in numerical calculation). At the same time, an unprecedented expansion of secondary education is taking place, resulting in the teaching of mathematics being in the hands of very many inexperienced and under-trained teachers.

This new series of textbooks attempts to cater for both aspects of this situation. The authors were both members of the National Committee which designed the secondary mathematics syllabus, and the content effectively covers the syllabus in the first three secondary years.

Each student's text covers one year's work. It consists of twenty-four units, carefully linked with preceding work and with in-built revision. There is a Practice Book for each year which provides an additional source of examples, where needed, though there are very many in the texts themselves.

The Teacher's texts take a novel form. They are simply the student's text over-printed in small red type, page by page, with answers and very brief teaching notes. They also contain answers to the exercises in the Practice Books. Whether they will provide adequate guidance to inexperienced teachers can only be assessed in use in Nigerian conditions; the strategy is realistic in the light of experience from many developing countries where separate and more elaborate teacher's guides are often ignored completely.

The texts themselves are clearly laid out, with liberal and effective use of diagrams, and seem likely to fulfil the

publisher's claim that they are well suited to both students' and teachers' needs in present-day Nigeria.

29.7 New World Maths by John L Fox, published by Longman Caribbean Ltd.
Book 1, 1979 at £2.15
Book 2, 1980 at £2.25
Book 3, 1982 at £2.75
Teacher's Handbook 1, 1979 at £2.65
Teacher's Handbook 2, 1980 at £2.85

This is a new series of textbooks, with accompanying teachers' guides, for secondary Mathematics in Caribbean countries.

In assessing any series of texts, one has to consider three aspects: the subject-content, the learning-style implied and the format in which these are embodied in the books.

In the case of this series, the mathematical content is determined by the various countries' Junior Secondary Leaving Certificates and the Caribbean Examinations Council (CXC) syllabuses. As such, it provides a balance between traditional computational skills and a lively introduction to more modern topics, including probability, symmetry, relations and transformations.

The teacher's handbooks suggest that a balance should be kept between class activities, small group activities and individual working. The pupil's texts address the pupil directly, and are therefore appropriate for self-study and individual work, while also being usable within a class-teaching framework. In **Book 1**, separate topics are dealt with in sequences lasting at most four pages. Corresponding sequences in subsequent books are rather longer, the whole series moving towards a more orthodox 'chapter' pattern. The purpose of this is to ease the transition from primary to secondary school, and this is a welcome feature.

The texts are very attractively produced, and pupils in the Caribbean region will immediately identify with the cultural and environmental background. There is liberal use of two-colour diagrams and many black and white photographs. In general, the photographs illustrate the theme, rather than being an integral part of the development.

The bulk of the teacher's handbooks consist of page-by-page teaching guides to the corresponding text, together with full answers. They provide adequate support for the under-confident or under-trained teacher, without going into so much detail that such teachers would find them daunting. The handbooks include assessment tests for use at appropriate points in the course.

Overall the series is attractively produced and appropriate in both content and style for Caribbean Secondary Schools. It deserves to be widely used.

29.8 Foundation Numeracy by Ruth Rees and George Barr, published by Edward Arnold, 1982 at £2.50

This little book is designed for students of all ages who wish to make a second start on mastering basic numerical skills. There is widespread recognition of the need for such a fresh start by many people in many countries. This need is not just for mastery of the standard algorithms, however; it is also for a 'feel' for numbers and their magnitudes, an appreciation of the nature of the basic arithmetical operations, their relevance in a wide variety of practical situations, and the growing confidence that comes from such understanding.

Although it mentions the need to estimate answers and to use common sense checks, this book concentrates almost entirely on the algorithms. Most of the examples are purely numerical, with too little attempt to show their relevance in practice; this is particularly true in the chapters on fractions and decimals.

Despite a two-page section on the use of the calculator, the book has not grasped the nettle of calculator availability. Several chapters end with the statement that the exercises in it could be repeated using a calculator. Calculators are more significant than that. Their effective use needs an understanding of the nature of the arithmetical operations, combined with a common sense appreciation of the likely size of the numerical answer to a problem. This book is unlikely to assist in the development of the first of these prerequisites. While it could be of some assistance in providing instrumental understanding and practice of basic arithmetical processes, its more likely value is to provide teachers with a source of examples to use within the context of a different style of numeracy teaching.

29.9 Maths with a Calculator by C Birtwistle, published by Edward Arnold, 1982 at £1.50

This book attempts to tackle a similar problem to *Foundation Numeracy*, reviewed above – that of providing school leavers and older people with a fresh chance to learn to cope with the numerical calculations that they meet in everyday life. Unlike *Foundation Numeracy*, however, it does this by basing the approach firmly on the use of a simple four-function calculator. Since about 1980 cheap, reliable calculators with longlife batteries have become widely available in most parts of the world, and this approach is therefore realistic across a wide spectrum of countries.

The book is suitable for those who have not used a calculator before. Work is developed as far as solving problems on percentages (whether or not the calculator has a percentage key), and simple and compound interest. Although there is a two-page section on estimation, there is little subsequent encouragement given to the reader to use pre-calculation estimation as a safeguard against pressing the wrong buttons.

Answers to all the exercises are contained in a separate leaflet, obtainable free on request from the publishers, whose address is given in the preface of the book itself.

29.10 A History of Mathematics Education in England by A G Howson, published by Cambridge University Press, 1982 at £25.00

In his recent books, as editor or as sole or joint author, Dr Howson has established himself as the leading British exponent of mathematics education from the social and historical viewpoints. His latest book is directly concerned with the development of mathematics education in England since the sixteenth century.

This scholarly yet very readable work takes the form of nine biographical essays, each dealing with a man or woman who was both personally influential in the development of mathematics teaching, and also representative of his time. In this way, we trace the way in which mathematics slowly gained a place in the curriculum of adult education institutes and thence eventually into the secondary school curriculum, until it holds the central place that we know today. At each stage developments were partly in response to, and inevitably constrained by, the social circumstances of the time. In the light of this evident and well-documented principle, it is all the more astonishing to consider how developments in mathematics education in Britain have been directly influential in the teaching and learning of the subject

in the schools of many countries across the world, in vastly different social, economic and environmental circumstances.

Reading this book provides another salutary reminder, that debates about the purposes and styles of mathematics in schools tend to be cyclic. Most of the issues of the 1970s and 1980s have parallels in discussions in earlier parts of this century, and indeed before. A particular example is that of a balance between understanding and technique.

This book is likely to remain the definitive text on the history of mathematics education in England for the foreseeable future. It is very much to be hoped that it will appear in paperback in due course, thus making it more widely available to individual, rather than just library, ownership.

29.11 SISCON-in-Schools (Science in a Social Context) by Joan Solomon, published jointly by Basil Blackwell and the Association for Science Education, 1983

After several years of development (SEN 43:19, 47:33) the first four titles of SISCON-in-Schools were launched during the ASE Annual Conference in January; the remaining four titles were published in March. These eight books provide a new and stimulating course on the interrelationship between science and society. Although aimed at students of sixth-form age and suitable for use in General Studies courses for A-level science specialists, they are also intended for use with students whose formal science education came to an end after the first three years of secondary schooling. A/O level and CSE Mode 3 examinations are available, but teachers and students will also find the books very suitable for use as enrichment materials in other courses and for non-examination studies. The course is not based on experimental work (for which there is only limited scope) but will normally centre around gorup discussion. The books provide the basic resource material and teachers may supplement this by the use of films, TV, magazine articles, simulations and games (suggestions are included in the Teachers' Guide). The topics dealt with include the role of government and industry in science, commercial applications of science, the impact of science and technology on society and on the environment, the nature of science and the responsibility of scientists for the outcome of their work. The following titles are available at £1.10 each:

Ways of Living
How can we be sure?
Technology, Invention and Industry
Evolution
The Atomic Bomb
Energy
Health, Food and Population
Space, Cosmology and Fantasy

The Teacher's Guide, which covers all eight units, costs £2.50.

29.12 Science Education 11 - 18 in England and Wale-report of a study group, published by The Royal Society, 1982, at £3.00

Also, the annexe to the report of a study group, at £2.00

The formation of the study group was reported in SEN 46:3. Its brief was to:

- review the teaching and examination of science (incl including mathematics) in secondary (11 - 18) schools in England and Wales, with particular reference to the constraints imposed by
  1. the ability and motivation of pupils;
  2. available manpower and financial resources;
  3. the perceived needs of those academic, industrial and administrative institutions which recruit from secondary schools.
- consider the needs of potential employers of trained manpower particularly in the following categories:
  1. those leaving school for immediate employment in technical posts;
  2. those leaving school at 18+ for higher education whether in science or the humanities, who would later have the task of maintaining the country's teaching, research and development capacity and participating in decisions affecting the use and management of scientists and technologists.
- consider how best to ensure an adequate national supply of manpower suitably trained for these tasks.
- make recommendations.

The main report covers the group's findings in the areas outlined above, while the annexe is a survey of British schooling with special reference to science education. The latter includes a chapter on finance – information which is not easily available elsewhere, and a very useful analysis of the science taught within the school curriculum.

The recommendations follow other recent ones from the DES in that they suggest that a full and balanced science curriculum should be followed by all pupils up to the age of sixteen, for about twenty per cent of their time in the last two years. They differ in emphasizing the distinctness of the three main sciences, and the need for teachers to be specialists in one of these disciplines. They recommend, as have many others, that applications from technology be regarded as essential elements in the science curriculum. With regard to the supply of teachers, they accept no economies or compromises! All science teachers should be required to follow a course of professional training and in-service training facilities should be increased, for primary teachers as well as secondary.

Single copies of a summary booklet are available free.

All these may be obtained from:

The Royal Society
6 Carlton House Terrace
London
SW1Y 5AG

29.13 Innovation in the Science Curriculum, edited by John Olson published by Croom Helm Ltd 1982, at £12.50

The past two decades have seen a plethora of curriculum development projects in science education worldwide. These have made many new demands regarding the laboratory and classroom practice of science teachers. It is ultimately the teachers' response to these demands which determines the extent to which the aims of the projects can or can not be achieved. This book reports and discusses case study research on the processes of curriculum change from this perspective.

In his introductory chapter John Olson (Queen's University, Canada) discusses some of the issues raised in the subsequent papers. He concludes that much curriculum work in science has been based on an inadequate conception of institutional life and of the teacher's role in it, and he proposes what he describes as 'a more humanistic frame'. Chapters follow by Rob Walker (University of East Anglia, UK) on his own work on the Case Studies

in Science Education Project; by Niel Sandelbach and Edward Smith (Michigan State University, USA) on teachers' planning for activity-based science lessons for the Science Curriculum Improvement Study programme; and by Sally Brown and Donald McIntyre (University of Stirling, UK) on the development and implementation of the Scottish Integrated Science scheme from the teacher's viewpoint. In his final chapter the editor looks at the concept of 'teachers' classroom influence' and suggests that this is central to understanding how teachers cope with the demands of inquiry teaching. All the papers presented have implications for curriculum policy and research in science and beyond, and Professor Olson argues that knowledge of these can help to focus attention on 'problems of communication which lie at the heart of curriculum renewal'.

29.14 Design Note 29 – Fume Cupboards in Schools by the Architects and Building Group of the Department of Education and Science

This short design note (eleven A4 pages) reviews the requirements for fume cupboards used in schools for teaching science, mainly chemistry and biology, up to A-level. It makes authoritative recommendations for the design, specification and installation of fume cupboards and their related extraction systems. Copies are obtainable free of charge from:

Publications Despatch Centre
Department of Education and Science
Government Buildings
Honeypot Lane
Stanmore
Middlesex
HA7 1AZ

29.15 Third World Science compiled by Professor Iolo W Williams and available from The Centre for World Development Education at £2.00 per unit or £32.00 for the full set of twenty units.

This excellent set of resource materials for teachers can be strongly recommended to anyone engaged in the teaching of science in developing countries and, indeed, elsewhere. The materials are presented in a loose-leaf format in plastic wallets and have been compiled from a variety of sources world-wide. They make use of 'illustrations of basic principles drawn from the environment, traditional craft practices and modern technological developments in the third-world'. It is intended that the materials are used flexibly and they include informative reading materials, charts, tables and photographs as well as teaching suggestions and accounts of experiments and project work. For use in schools copyright is waived so that multiple copies can be reproduced for pupils. The development of these materials was previously reported in SEN 43:35, 44:27 and 49:19 to which the reader may refer for additional information. The following units are now available; others are being developed.

- *Carrying Loads on Heads*
- *Cement* (in preparation)
- *Charcoal*
- *Clay Pots*
- *Dental Care*
- *Diet and Nutrition* (in preparation)
- *Distillation*
- *Energy Convertors*
- *Fermentation*
- *Food Preservation* (in preparation)
- *Fuels*
- *Housing*
- *Iron Smelting*
- *Methane Digestors*
- *Natural Dyes*
- *Natural Fibres*
- *Plants and Medicine*
- *Salt*
- *Soap*
- *Vegetable Oils* (in preparation)

Orders should be sent to:

The Centre for World Development Education
Buckingham Palace Road
London
SW1W 9SH

29.16 Basic Secondary Science by B Nicholl & A H Sloss with advice from E O Aderinlewo, P Asun, D N Onwukwe & S O Oriaifo, published by Evans, 1982
Students' Book 1 at £2.95
Students' Book 2 and 3 at £3.50 each
Projects Books 1 - 3
Teachers' Books 1 - 3 at £5.80 each

This series was adapted for Nigeria from an American integrated science course, the Intermediate Science Curriculum Study, but would also cover the requirements of many other Junior Secondary Science syllabuses in Africa. It is an activity-based course and pupils are led step by step through a well-organized sequence of simple experiments, checking off their answers to a series of questions. Results are recorded in the Projects Books and the processes of scientific enquiry are emphasized. The course is suitable for individualized learning as well as for ordinary class teaching. Each chapter concludes with a check-list of questions which are cross-referenced to the text as an aid to revision. The books are attractively produced and the text clearly laid out and well illustrated, although this reviewer was concerned that the language level might sometimes cause problems. The teachers' guides contain all the material in the pupils' text with the addition of objectives and useful notes on teaching and on the experiments. An unusual, but very helpful, feature is a complete check-list (at the beginning of each book) of answers to the series of experimental questions in the pupils' books. A teacher in Africa who is looking for a new general or integrated science text for the first three years of secondary schooling would be well advised to have a good look at this interesting series.

29.17 Tropical Biology: a practical course, by O J Jegede, published by Macmillan Education, 1982 at £1.95

This is a straightforward practical manual for use in O-level or School Certificate Biology in tropical areas. Plant and animal structure and function and their interdependence are covered.

For each exercise a list of materials and an illustrated set of instructions is followed by questions which draw out the significance of what is seen. Each chapter ends with a summary of facts discovered and some revision questions. It is a useful outline of practical work, and encourages pupils to think about their tasks. It does not provoke them to think further or design experiments for themselves.

29.18 Biology for the Individual: book 11 – Life of Plants, by P Booth, published by Heinemann Education, 1981 at £2.20

It should be noted that while the first eight books in this series are suitable for early secondary pupils, the last three are intended 'to stimulate resource-based learning in a variety of Biology and Human Biology courses for the 13 - 17 age range'. This book covers water relations and nutrition in the plant.

With little or no preliminary explanation, each section begins with experimental work. Instructions illustrated by diagrams, are clearly given and followed by questions to elicit the results and conclusion. Understanding of the topic is developed carefully with short explanations interspersed with structured questions and further experiments. There is then a set of test and further homework questions, to which the answers are given at the back of the book. A number of these questions test understanding. The more able pupil will be challenged by this book; the average pupil will need each step consolidated by class discussion if he is to have a full grasp of the subject. A teacher would find this a valuable resource of ideas for posing questions.

29.19 Beginning Science: Biology by B S Beckett, published by Oxford University Press, 1983 at £2.75.

This is intended as an introductory course at junior secondary level, both for those who will study the subject further and those who will not. It is presented in the clear format in which OUP specializes, with a single page opening for each sub-topic, and a variety of column widths which adds interest to the presentation. The author's line drawings are copious and beautifully clear.

The text is, however, almost entirely descriptive, without reference to any experimental work. Each sub-topic ends with a set of questions which can be answered directly from a study of the text in almost every case. Open-ended thought-provoking questions are limited to sections at the end of each major topic.

In addition to the topics expected in an introductory course, there are a number included for their social relevance, eg space biology, whole foods, and new medical techniques.

29.20 Adventures with Small Plants, by O Bishop, published by John Murray, 1983, limp £2.95 and cased £4.95

This is essentially an 'activity book', useable by children from 9 - 16 years, for project work at school or home. It would also provide a less experienced teacher with much useful information on handling plants. There are ideas for growing or studying algae, mosses, ferns, duckweed, insectivorous plants and cacti, as well as common house plants, the garden lawn, seeds and cuttings.

Each chapter begins with a short description, then lists 'things you need' and gives instructions for 'getting started'. This is followed by suggestions for 'what to do next' – further observations, experiments or information gathering. Many of the questions interspersed with the text, would form a basis for class discussions.

29.21 Biology 11 - 13, by P J Mawby and M B V Roberts, published by Longman, 1983, at £3.95

The third in this series of books for teaching the separate sciences in the first two secondary years is now available (the others are *Physics 11 - 13* and *Chemistry 11 - 13*, also from Longman).
The contents include the activities of plants and animals and their life cycles, and chapters on their habitat, classification, population, distribution and interdependence.

The layout is especially clear. The text is divided into short sections by bold headings; a wide margin is frequently used for diagrams; Instructions are given for a large number of experiments. Expected results are not given, nor are conclusions drawn, but each experiment is followed by a set of 'questions for class discussion' from which these will emerge. 'Homework assignments' are included in the text, and many are open-ended and provoke thought. Each chapter ends with a summary. The experienced teacher might find the amount of direction irksome, but the less experienced will welcome the degree of support for an investigative course.

29.22 Physics: A Textbook for Advanced Level Students by Tom Duncan, published by John Murray, 1982, at £8.50
This is a combined volume incorporating the second editions of the author's two well respected sixth form books *Advanced Physics: Materials and Mechanics* and *Advanced Physics: Fields, Waves and Atoms*. The text has been updated, especially as regards electronics but otherwise there have been few changes. Both text and illustrations are clear and attractively presented and many teachers will find the new single volume format has much to recommend it.

29.23 Diagnostic Testing in Advanced Physics by Eric Deeson, published by Hodder and Stoughton 1981, Test Volume £1.95; Complete Volume £3.75

This volume contains over 350 multiple-choice items which are arranged as a series of tests on a comprehensive range of topics from GCE A-level physics. In the detailed notes for teachers at the back of the complete volume the author not only classifies each item in terms of the educational objectives it is intended to reflect (using Bloom's taxonomy) and provides the answer, he also discusses the thinking behind the question and the common errors which lead students to select some of the distractors. These notes should be particularly helpful to teachers in assessing the effectiveness of their teaching and identifying remedial needs. Alternatively some teachers may prefer to allow students to work on their own using the complete volume. There are companion volumes in biology and chemistry.

29.24 Skills for Learning – Reading Projects: Science, published by Nelson – University of Malaya Press 1981, at £3.65, Teachers' Book £2.25

The 'Skills for Learning' materials were published following research at the University of Malaya into the optimum method of teaching undergraduates with little knowledge of English how to extract important information from recommended textbooks. The aims of *Reading Projects: Science* are to expose students to 'styles of writing and modes of presentation' characteristic of science and to develop skills in studying from texts. The 'modes of presentation' referred to include graphs, formulae, tables and flow charts as well as words. The book for students presents a carefully planned sequence of lessons arranged in four parts dealing with (1) basic study skills, (2) the integration and consolidation of such skills, (3) guided research and (4) independent research. The teachers' book provides detailed guidance on the preparation and conduct of the lessons as well as giving answers to the various assignments. The lessons from part two onwards are taken from physics, chemistry, biology, ecology and geology, but the focus is entirely on the skills involved in extracting information and not on the content as such. Although intended to be used as part of the complete 'Skills for Learning' course (which consists of four course books in

addition to the Reading Projects) these well researched materials might form the basis of a shorter course in their own right. Again, although intended for students whose first language is not English, many students who are native English speakers would have much to gain from working with an experienced guide through these stimulating and well-organized reading projects.

29.25 Questions and Solutions for A-level Chemistry by Peter Brown, published by Edward Arnold, 1982, Questions £2.50, Solutions £2.50

This is a collection of structured (not multiple-choice) questions covering the main areas of most A-level syllabuses. They provide quite a thorough and thoughtful coverage and would be useful not only for assessment purposes but as a series of revision exercises.

29.26 Problem-Solving in Chemistry by M Selvaratnam and M J Frazer, published by Heinemann Educational Books, 1982, at £4.95

This rather unusual book sets out to provide detailed assistance to pre-university and undergraduate chemistry students in solving numerical problems in general and physical chemistry. Emphasis is placed throughout on a five-step procedure for problem-solving and an early chapter also examines the basic mathematical techniques required. Problems from different areas of chemistry are considered systematically on the basis of twenty-six equations defining physical properties with examples to illustrate fundamental problem-solving principles and practice exercises. This would be a useful reference book or supplementary text for A-level or first year undergraduate chemistry students.

29.27 Objective Tests in O-level Chemistry by Derek Stebbins published by Heinemann Educational Books, 1982 at £2.50

This is not just another book of objective test items. Firstly the questions have all been fully pre-tested and have all appeared in O-level multiple choice papers of London and Nuffield Chemistry examinations. Secondly the answers to each item are discussed at considerable length with the aim of helping the student to 'develop in general chemical understanding while gaining in confiddence and competence at dealing with questions of this type'. A wide range of O-level topics is covered in sixteen tests of thirty items each; much better than the run-of-the-mill and highly recommended.

Overseas and International Activities

30 Mathematics Education in the Soviet Union

A short account of the Second Anglo-Soviet Seminar on Mathematics Education was given in SEN 50:32. The report is now available from:

Consultancies Group
STED
The British Council
10 Spring Gardens
London
SW1A 2BN

The report which runs to over 200 pages includes all the papers presented at the Seminar by both the British and Soviet participants. Themes covered include an overview of major current issues in Mathematics education in the two countries, the aims of Mathematics education, how to ensure that the planned outcomes of a Mathematics curriculum are actually achieved, the place of Applied Mathematics in schools, Geometry, assessment and the training of Mathematics teachers. Summaries of the Seminar discussions are also included.

While not purporting to be comprehensive, this report, together with that of the First Anglo-Soviet Seminar on Mathematics Education (which is still available), probably contains the most up-to-date information available in English on current thinking and practice in the teaching of Mathematics in Soviet schools. It is hoped that more detailed information on the school Mathematics curriculum, illustrated by translated extracts from current texts, will be made available in due course, either as a separate report or in an appropriate journal.

31 PRISM 81: seminar report

The Southern Africa Regional Seminar on Primary School Mathematics, which was hosted by the Ministry of Education, Lesotho in November 1981, was reported in SEN 47:51. The report is now available on request to:

Consultancies Group
STED
The British Council
10 Spring Gardens
London
SW1A 2BN

The report is a substantial document running to over 130 pages. The excellent keynote address, 'Learning as the Key to Curriculum Development' by Mr P G Scopes, is reproduced in full, as are other papers given by participants from Botswana, Britain, Lesotho, Malawi, Mauritius, Seychelles, Swaziland, Zambia and Zimbabwe. The themes of the papers are:

- Strategies for Curriculum Development
- Content and Method for Primary School Mathematics
- Pupil and Teacher Materials
- Teacher Education
- Primary Mathematics Guidelines in England
- Preparing a Textbook Series
- Learning Mathematics Through Activity
- Cognitive Development in Africa – The Botswana Case
- Problem-Solving.

The report also includes summaries of working group discussions, together with the various recommendations that arose out of them to improve the quality of primary mathematics education in the participating countries.

One outcome of PRISM 81 was the establishment of a centre in the region to facilitate the exchange of materials and ideas on primary mathematics among the countries concerned. This centre is presently located in Lesotho. Enquiries may be made to:

PRISM Secretary
Mr A Herriot
c/o The British Council
PO Box 429
Maseru Lesotho.

32 The Mathematics in Society Project (MISP)

MISP was formed in 1980 as an international association of groups of mathematics educators in Australia, Britain, Italy, Canada, USA, Spain and Poland. The overall purpose of MISP is the interchange and implementation of new ideas, and the production of new secondary school courses in Britain, Australia and North America, based on a distinctively new conception of school mathematics, relating it much more closely to the needs of society

than has been the case with most previous courses. MISP will incorporate many ideas from the physical, biological and social sciences, from geography and history as well as from all aspects of everyday life.

A detailed analysis of the philosophy of MISP, how the ideas arose, and what progress has been made during its first three years of existence will be found in *Mathematics in Society: The Real Way to Apply Mathematics?* This may be ordered from:

MISP
22 Violet Grove
Hawthorn
Victoria 3122
Australia

The cost is A$5.40 per copy (surface) or A$7.25 per copy (airmail), and orders should be accompanied by an International Money Order or cheque made payable in Australian dollars to 'Mathematics in Society Project'.

33 ICMI — JSME Asian Regional Conference on Mathematical Education: Japan, 1983

World conferences convened by ICME take place every four years; as notified in SEN 47:47, the next will take place in Australia in August 1984.

Between these world conferences, ICMI, the International Commission for Mathematical Instruction, assists national bodies to organize regional conferences. The next of these, as announced in SEN 49:37, will take place in Tokyo, Japan, 10 - 14, October 1983. The second Circular of the Conference is now available from the Conference Secretary:

Mr T Sawada
c/o National Institute for Educational Research
6-5-22 Shimomeguro
Meguro-Ku
Tokyo
153 Japan.

34 ICMI Symposium: Poland, 1983

The next International Congress of Mathematicians, originally scheduled for August 1982, will now take place in August 1983 in Warsaw (SEN 47:48 and 48. Stop Press).

The dates of ICM are 16 - 24 August, and of the ICMI Symposium 16 - 19 August. The theme of the Symposium is 'What Should be the Goals and Content of General Mathematical Education?'. The Symposium will be chaired jointly by Professor H-G Steiner of the Federal Republic of Germany, and Professor A Z Krygowska from Poland.

Further information can be obtained from the Secretary of ICMI:

Dr A G Howson
Faculty of Mathematical Studies
The University
Southampton
SO9 5NH.

35 The Sixth Inter-American Conference on Mathematical Education: Mexico, 1983

This conference which had been due to take place in Mexico towards the end of November 1983 has now been postponed. We hope to publish further details in SEN in due course.

36 International Group for the Psychology of Mathematics Education

The International Group for the Psychology of Mathematics Education, known as PME, was formally brought into existence at the Third International Congress on Mathematical Education held in Karlsruhe, West Germany in 1976 and, at that time, became one of the groups affiliated to ICMI.

Aims

The major aims of PME are to:

- promote international contacts and the exchange of scientific information in the psychology of mathematics education
- promote and stimulate appropriate inter-disciplinary research with the cooperation of psychologists, mathematicians and mathematics teachers
- increase understanding of the psychological aspects of learning and teaching mathematics and of their implications.

PME's current membership of approximately 500 is to be found in fairly equal proportions in Europe and North America. However there are members in Japan, India, Mexico and New Guinea, and membership is growing in Israel and Australia. Members keep in touch through a newsletter which is distributed twice yearly.

However, the major activity of PME is the annual Conference. The first of these was held in Utrecht, Holland in 1977. Since then, conferences have been held in West Germany, Britain, USA (coinciding with ICME 4), France and Belgium. The seventh PME conference will be held in Israel, from 24 - 29 July 1983 and the eighth in Australia to coincide with ICME 5 in 1984.

Annual conferences provide an opportunity for members, and local teachers and researchers, to exchange information and results. Conference proceedings are published in book form and can be obtained from either of PME's distribution centres:

Shell Centre for Mathematical Education
University of Nottingham
University Park
Nottingham
NG7 2RD

or

Wisconsin Center for Educational Research
University of Wixconsin
1025 W Johnson Street
Madison
Wisconsin 53706
USA

Requests for the second announcement of the seventh PME Conference to be held in Israel this year should be sent to:

Rina Hershkowitz
Department of Science Teaching
The Weizmann Institute of Science
76100 Rehovot
Israel
(Telex number 31900 IL)

The current officers of PME are:

President: Gerard Vergnaud
Maison des Sciences Humaines
Psycho
54 Boulevard Raspail
75270 Paris
France

Vice-President: Jim Moser
Wisconsin Research and Development Centre
Madison
Wisconsin 53706
USA

Secretary: Leone Burton
Avery Hill College
Bexley Road
Eltham
London
SE9 2PQ

Treasurer: Hartwig Meissner
Westfalische Wilhelms Universitat
D-4400 Munster
West Germany.

37 South-East Asian Mathematical Society (SEAMS)

Professor V Boonyasombat, Department of Mathematics, Chulalongkorn University, Bangkok 10500, Thailand has succeeded Professor Lee Peng Yee as President of the South-East Asian Mathematical Society.

Preliminary plans have been made for the Third South-East Asian Conference on Mathematical Education to be held in Thailand during the last week of May 1984. The Conference Secretary is Dr S Nualtaranee of Chulalongkorn Unviersity.

We shall publish further details of this Conference in SEN in due course.

38 International Colloquium on Geometry Teaching: Belgium (SEN 48:39)

The revival of interest in school geometry was demonstrated by the attendance of about ninety people at this meeting. Most participants came from the various countries of Western Europe. The proceedings, which run to 360 pages, are now available at a cost of 250 Belgian Francs (surface mail) or 300 Belgian Francs (airmail). Payment should be made to 'Credit Communal de Belgique', account number 068-0563410-61, payable to 'ICMI-Belgium', and sent to:

Dr G Noel
14 bis Rue des Fontaines
B7460 Casteau
Belgium.

39 Twenty-Fourth International Mathematical Olympiad: France, 1983

To update an earlier article (SEN 50:41) we can now confirm that the 24th International Mathematical Olympiad will take place in France between 1 - 12 July 1983.

Each team will consist of six members.

40 National Mathematics Contest: Tunisia

In 1976 the Tunisian Association for Mathematical Sciences inaugurated an annual National Mathematics Contest which was open to the better pupils taking mathematics in the sixth year of Tunisian secondary schools. The organizers perceived the competition as being a special way of motivating pupils to take a keener interest in mathematics and as a means of distinguishing those pupils capable of learning from new situations in which they would have to bring to bear the qualities of reading and comprehending problems, identifying the appropriate mathematical model in given situations, analysing problems and expressing their work and calculations in a clear and concise manner.

The exercises for the competitions have been chosen so that the candidates can use the knowledge and the methods they have acquired in the first five years of secondary school but at the same time taking the candidates off well-worn paths and avoiding the use of classic textbook exercises.

No official Contest format has been instituted, nor is pre-competition training supposed; the organizers have felt free to amend the Contest format from year to year.

The first Contest took place in 1976 on the occasion of the 20th anniversary of independence in Tunisia with 256 participants, rising to 456 participants by 1980.

Tunisia also participated in the twenty-second and twenty-third International Mathematical Olympiads in USA and Hungary with two and four candidates on each occasion respectively.

41 Omar El Khayam: Tunisian mathematics journal

The Tunisian Association for Mathematical Sciences has decided to publish a journal entitled *Omar El Khayam* (after the tenth century Arab-Persian mathematician) for pupils in the sixth year of Tunisian secondary schools.

Omar El Khayam will present the readers with exercises, problems, mathematical games and a rubric Contest/Olympiad as well as provide articles on Astronomy and the History of Mathematics. Readers will be invited to submit their solutions to the individual problems and it is proposed that the best solutions will be published in subsequent issues of the journal with a list of those readers who have provided correct answers.

The editors hope that *Omar El Khayam* will assist in developing team spirit and a taste for mathematics among pupils.

The first thirty-two page edition of this journal was issued in autumn 1982. It is written in two parts, one part in French, the other in Arabic.

42 International Commission on Mathematical Instruction (ICMI)

The members of the ICMI Executive Committee were listed in SEN 50:35.

ICMI Bulletin number 13 is now available from:

Dr A G Howson
ICMI Secretary
Faculty of Mathematical Studies
The University
Southampton
SO9 5NH
England

As well as details of ICMI itself and a list of the National Representatives from the fifty-plus affiliated countries, the Bulletin contains details of a number of important international conferences and symposia concerned with mathematics education. In particular the outline of the programme for ICME 5 is included.

An innovation in this issue of the Bulletin is the first of a series of articles on international journals and referencing services for mathematics education, the first journal selected being *Educational Studies in Mathematics*. The next issue, due for October 1983, will see the start of a series of articles on institutions for the development of mathematics education, the first describing the work of the IREMs in France. This issue will also contain information from various countries on the theme of 'mathematics and language'.

A notable feature of the *ICMI Bulletin*, which it shares with this Newsletter, is that there is no copyright on any of the material. Both aim to provide a service to other Editors who may utilize any material that they wish.

43 International Directory of Mathematical Associations

Murray Macrae of the Mathematical Association (UK) is currently collating an International Directory of Professional Associations of Teachers of Mathematics, with a view to improving international links in the professional network.

Secretaries of such Associations are invited to write to him with details of their organization and to provide the names of their respective committees.

When the Directory is complete an announcement will be made in SEN.

Entries for inclusion should be sent to:

Mr M Macrae
Honorary Assistant Secretary
The Mathematical Association
10 Bennett's Walk
Morpeth
Northumberland
NE61 1TP
England.

44 Investigations in Mathematics Education: journal

Investigations in Mathematics Education is a journal devoted to making information about mathematics education research available to educators interested in using research results to improve mathematics education.

Selected research reports are abstracted and critiqued by experts in mathematics education. These reviewers not only note the strengths and weaknesses of the research, but also discuss the broader issues raised or considerations for further research.

Investigations in Mathematics Education is published four times a year. The subscription price is US$6.00 per year (single copy price is US$1.75). Please add US$0.25 to Canadian subscriptions and US$1.00 to all other foreign subscriptions to cover mailing costs. Payment should be made in US dollars to:

IME
ERIC Clearinghouse for Science, Mathematics
and Environmental Education
Room 301
3rd Floor
1200 Chambers Road
Columbus
Ohio 43212
USA

45 In-Service – On-Service Teacher Training: Indonesia

Pemantapan Kerja Guru (PKG) means, roughly, support for the work of teachers. This is the theme of a massive programme for improving the quality of science and mathematics teaching in secondary schools throughout Indonesia, whereby teachers are given support in their own schools so that the new skills and attitudes they learn are practised and reinforced as a part of their regular teaching activity.

The problems facing secondary education in Indonesia are formidable. They include: a very rapid growth rate which puts a great strain on physical resources as well as changing the traditional elitist profile of the school population; formal lecturing methods by which teachers are trained, and which are used in schools; and simply the size and logistical difficulty of any national project in Indonesia.

Training Instructors

The PKG project operates as follows: from each Province (starting with three or four, now growing towards twenty-six of the twenty-seven Provinces) a group of the best teachers are selected to become **instructors**. They are initially given three months' training at the Regional Centre for Education in Science and Mathematics (based in Malaysia); this is followed by study tours to, for example, Thailand, Sri Lanka, and Australia, and after a further orientation course at the National In-Service Centre in Indonesia they return to their respective Provinces: at first they go back to their own school to spend a term **practising** the new methods they have learnt but after that they are ready to **instruct** on the in-service–on-service programme in their Province.

Training the Teachers

The school year in Indonesia is divided into two semesters. A first group of up to twenty teachers teaching biology, chemistry, and physics is selected, usually on a geographical basis. At the beginning of one semester these teachers attend a two-week in-service course which introduces them to the materials and methods of modern science teaching within the context of the Indonesian curriculum (these in-service courses are run by the **instructors** with some help especially for content matters from consultants from universities in Indonesia). Following this the **teachers** return to their schools and start trying to use the new materials and methods. The key to the project is this 'on-service' period; while the **teachers** are in school, the **instructors** come to visit them, watch lessons, discuss problems, and generally reinforce the methodology that has been learnt. Additionally teachers meet together every Saturday morning to discuss their week's work. In the middle of the semester there is another one week in-service course and again at the end of the second half semester on-service period, a further two week in-service seminar for evaluation and preparation for the future.

Teachers who complete this one semester in-service-on service training may be said to have been PKGed'. The **instructors** move on to a new cycle, with another group of teachers. Within six to eight such cycles, three or four years) it is hoped that some seventy-five per cent of existing teachers will have been 'PKGed'.

The qualitative effect of PKG seems to have been strikingly successful: Dr Philip Adey, the British Council Education Officer in Indonesia who submitted this article, has visited many pre-PKG, current PKG and past PKG

Teachers' classrooms and is in no doubt that the project has had a significantly positive and, as far as one can tell at this stage, permanent effect.

The main problem that remains is that the secondary system is expanding so fast that new teachers are entering the system as fast as they can be 'PKGed'. A possible solution to this lies in a new World Bank project to improve the quality of the Teachers Colleges. In five years' time it is hoped that newly emerging teachers will not **need** PKG.

Meanwhile, in the next phase of the project, certain schools in each Province are being designated in-service centres. They will be staffed by PKG instructors, and will act as permanent bases for providing PKG-type materials and help to new teachers.

PKG is a jointly funded venture of the Indonesian Ministry of Education, and UNESCO/UNDP. The British Council has provided some help in the form of sponsoring a Mathematics Consultant, and by seconding its Education Officer in Indonesia for one or two days a week. The British Council has also arranged study tours and training attachments in Britain for PKG, on a client-funded basis.

In the next issue of SEN we shall feature an article on 'Primary Science in Indonesia: A Strategy for Change'.

46 Science and Society Curriculum Project: Philippines

The Science Education Center of the University of the Philippines recently launched its Science and Technology Education in Philippine Society Project (STEPS). The project aims to develop a set of modules for grades 5 - 12 on selected science and technology topics affecting Philippine society and environment.

The modules are intended to supplement and update science textbooks and references used in schools and to make teaching more relevant to current local issues and national developmental goals. In particular, it is hoped that the modules will enable the target students to do the following:

- discuss and explain the benefits and limitations of scientific knowledge and some harmful effects of its use on Philippine society and environment
- explain some basic science concepts and use some simple science processes and mathematical skills involved in what is grown in and taken from the local environment and in what is made in the country
- develop some skills in utilizing indigenous resources and skills in inquiry and decision-making
- recognize the finite nature of Philippine and world resources and conserve and wisely use local resources for the country's present and future needs
- recognize the need for a multidisciplinary approach to solving some social problems and
- recognize the interaction of science and some Philippine values and beliefs and develop a sense of nationhood and love and respect for things Phillipine.

For a given topic, a module will be written for the elementary level (Grade 5 or 6), another for the secondary level (grade 7, 8, 9 or 10), and a third for the college level (grade 11 or 12).

A questionnaire was administered to a sample of elementary, high school and college students in public and private schools to solicit their suggestions on the topics to be written and how these are to be written. Science policy-makers, school administrators and science teachers were also interviewed to get their suggestions on the content and approach of the modules.

The writing team for a given topic is composed of scientists, science teachers, and science educators, and whenever possible, students. The modules will be tried out in selected public and private schools. Exemplar modules will be printed by the end of this year.

47 A Study of Science Education: Canada

In SEN 44:40 we noted the terms of reference of a study of science education in Canada to be undertaken by the Science Council of Canada. The Council's mandate was to 'assess the scientific and technological resources, requirements and potentialities of Canada' and to 'increase public awareness of scientific and technological issues'. The project was seeking answers to two principal questions:

- what is the current state of science teaching in schools?
- what should be the future directions for science teaching?

Determining the present state of science teaching in Canada demanded research of a variety of types but questions about future directions will demand deliberation, not only by researchers, but by all those with a stake in the outcome: teachers, parents, business and industry, the academic community etc.

The study consists of three phases

- issue identification: begun in 1979 and continuing through 1982
- data collection: 1981-1982; preliminary research reports produced by the end of 1982
- option development: 1982-1983; provincial deliberative conferences planned for 1983 leading to Science Council's final recommendations.

During autumn 1981 the Science Council of Canada mailed 10,000 questionnaires to science teachers throughout the country and received a very high rate of return. At the same time a review was undertaken of Ministry (Department) of Education policies for Science, and eight case-studies of science classrooms and an analysis of science textbooks were initiated.

Another of the study's objectives was to learn more about the opinions of those involved in science education; in order to do this and to encourage discussion the Science Council undertook the publication of various **discussion papers**:

- *A Canadian Context for Science Education:* it expresses regret at the lack of attention science education pays to the specific characteristics and problems of Canadian society; it also notes the absence of Canadian content in science programmes and the urgency of developing the study of the history of Canadian science and technology and the importance of making the public aware of the influence of science and technology in their daily lives.
- *Science in Social Issues:* this paper draws attention to the fact that the content of science courses is given no social or political context.
- *A Engineers View of Science Education:* the author of this paper comments that there is too much focus on the theoretical aspects of the sciences and not enough on their practical applications.

– *What is Scientific Thinking?*

– *A Holistic Approach to Science Teaching.*

Other publications include the proceedings of various **workshops**:

– *Who Turns the Wheel?* proceedings of a workshop of the science education of women in Canada

– *Quebec Science Education: Which Directions?*: proceedings of a symposium co-sponsored by the Science Council of Canada and the Association des Professeurs de science du Quebec.

– *Science Education in a Computer Age* (forthcoming).

The workshop on the science education of women in Canada also issued a separate publication entitled, *Statement of Concern: the Science Education of Women.*

The Final Stage

Between February and June 1983 special meetings were to be held in every province and territory with the following aims:

– exchange views on the study's findings
– discuss the objectives of greatest importance for science education in the 1980s and 1990s
– determine the changes needed to support new directions
– attend to the particular concerns of each province
– make suggestions for the Science Council's report.

Invited participants for these 'Provincial Deliberative Conferences' would include officials from Ministries, school boards and schools; teachers, teacher educators, and science supervisors; university, government, industry; school trustees, parents, and students; members and staff of the Science Council of Canada.

For further information and copies of the publications mentioned above write to:

Graham Orpwood
Science Council of Canada
100 Metcalfe Street
Ottawa
Ontario
K1P 5M1
Canada.

48 The National Science Board Commission on Pre-College Education in Mathematics, Science and Technology: USA

In the United States of America the National Science Board (NSB) has established a Commission on pre-College Education in Mathematics, Science and Technology, composed of twenty persons from a wide variety of fields and co-chaired by William T Coleman, junior, and Cecily Cannan Selby. It has been set up in response to the current decline in the quality and quantity of pre-college mathematics and science education.

The aim of the NSB Commission is to define a national agenda for improving mathematics and science education in the USA; it will develop an action plan that will include a definition of the appropriate roles and responsibilities of federal, state, and local governments, professional and scientific societies, and the private sector in addressing this problem of national dimension.

The Commission will be active over a period of eighteen months and will issue interim reports on its findings. The Commission is charged to:

– examine the existing evidence on the quality of pre-college (all classes, K-12) education in mathematics and science

– identify where current practices and policies fail to ensure the entry, selection, education and utilization of the full range of potential talent in science, mathematics and engineering

– identify and analyze existing mathematics and science programmes, teaching materials and teaching techniques whose success may justify imitation or adaptation

– develop an understanding of the roles that all systems – government and private organizations, professional groups and individuals – can play in improving mathematics and science education

– establish a set of principles, options and strategies which can be used to improve the quality of secondary school science and mathematics education.

49 International Seminar on Misconceptions in Science and Mathematics: USA, June 1983

In view of the growing research interest in misconceptions (or 'alternative conceptions' or 'alternative frameworks') held by students of science and mathematics at school, college or university, the organizers believe that the time is ripe for concerted discussion of problems in this field. To this end they invite interested science educators to attend this seminar, which will take place from 20 - 22 June 1983 in the Department of Education (Stone Hall), Cornell University, New York.

Topics to be considered include:

– underlying theories
– categories of 'misconception' (including consideration of nomenclature used by different groups)
– methods of detecting 'misconceptions' (eg paper-and-pencil tests, clinical interviews)
– reliability and validity of misconception tests
– consequences of misconceptions
– methods of correction and elimination (including use of interactive microcomputer programs)
– source of misconceptions.

The programme directors will be Professor Hugh Helm (Visiting Fellow), Physics, Rhodes University and Professor Joseph D Novak, Science Education, Cornell University. Programme content will not be limited to the topics suggested above and participants may choose to examine any relevant concept or problem.

The registration fee is $20 US.

Accommodation close to the campus will be available at reasonable cost.

For further information contact:

Dr Hugh Helm
Department of Education
Stone Hall
Cornell University
Ithaca
New York 14853
USA
Telephone: 607/256 2267

50 Third International Symposium on World Trends in Science and Technology Education: Australia, 1984

The Third International Symposium on World Trends in Science and Technology Education will take place from 10 - 20 December 1984 at the Mount Gravatt Campus of the Brisbane College of Advanced Education.

The first Symposium took place in Canada in 1980 (SEN 44:25:10). The second Symposium took place in England in 1982 (SEN 47:66).

It is expected that there will be a large number of delegates from about fifty different countries at the third International Symposium, when the main theme will be Teaching the Interactions of Science, Technology and Society (STS).

There will be three main groups of speakers. The first invited group will talk on how to teach STS. This group will include Professor John Ziman FRS (author of *Teaching and Learning about Science and Society)*, Professor Tom Stonier, (Professor of Science and Society, University of Bradford), Dr Ian Lowe (Head of the Science Policy Unit, Griffith University) and Scott McKenzie.

The second invited group will consist of Keynote Speakers who will discuss some of the social implications and technological applications of science. The speakers will include Mr Bob Hawke, Professor Sir Ernest Titterton, Mr Barry Jones MP and Mr Justice Kirby.

The third group will include delegates' papers, all of which will be printed and distributed in advance so that as much time as possible can be devoted to group discussion.

International events will include the International Committee Chairman's report and a discussion of the formation of an STS International Network.

The social agenda will include a Government reception, visit to rain forests and excursions to nearby tourist resorts (such as the Gold Coast).

The Symposium fee of A$600 will include ten days full single room accommodation, all meals, excursions and a copy of pre-conference publications.

For further information about the Third International Symposium please contact:

Dr W Hall
Chairman
Third International Symposium on World Trends in Science and Technology Education
P O Box 82
Mount Gravatt
Queensland
Australia, 4122.

51 Workshop on Locally Produced Equipment for Chemical Education: Denmark 1983

This workshop is being arranged in collaboration with the International Council of Scientific Unions (ICSU), the International Union of Pure and Applied Chemistry (IUPAC) and the Danish UNESCO National Commission, with financial support from UNESCO.

Venue

This workshop will be held between 12 - 17 August 1983 at the Royal Danish School of Education Studies in Copenhagen.

Aim

The purpose of the workshop is to bring European scientists together to:

- exchange plans for equipment that they themselves have developed, and which they consider useful for work in developing countries
- evaluate this equipment in the laboratory, especially in terms of courses in developing countries
- suggest further work in the field.

The preliminary list of invited speakers includes:

P E Child (Ireland)
G Foxcroft (UK)
E Garbowski (France)
S F A Kettle (UK)
D Maass (West Germany)
J Ruzicka (Denmark)
K Sane (India)
H Schmidt (West Germany)
P Srivastava (India).

It is anticipated that invited and contributed papers will be collected in a book which will be available to interested chemists in developing and other countries, sponsored by ICSU and IUPAC.

Accommodation

A few rooms will be available in a student hall next to the Chemistry Department. Price $15 per night for double rooms and $12 for single rooms.

Housing in conveniently located hotels is also available. Price range $25 - $50.

A meal plan including three meals a day (except Sunday) is available. Price $65.

Travel support may be available for a small number of participants; for further information write to:

Erik W Thulstrup (Workshop Director)
Royal Danish School of Education Studies
Department of Chemistry
Emdrupvej 115B
2400 Copenhagen NV
Denmark.

52 International Newsletter on Chemical Education

Issue number eighteen contains a series of specially commissioned articles on microcomputers in chemical education. The authors are from Australia, Canada, Italy, Papua New Guinea, Switzerland, UK and USA. There will be contributions from other countries in issue number nineteen.

The Newsletter can be obtained from:

Professor D J Waddington
Department of Chemistry
University of York
Heslington
York
Y01 5DD
England.

53 Conference on the History of Physics and Physics Education: Italy, 1983

An international conference under the auspices of the International Commission on Physics Education will be held between 5 - 9 September 1983, the main purpose of which will be to consider the ways in which historical, philosophical and sociological perspectives of science may be used to illuminate and stimulate the teaching of physics and the public understanding of physics.

The conference will be hosted by the University of Pavia, Italy and will conducted in association with the Deutsches Museum, Munich and the London Institute of Education.

Part of the work of the conference will take place in four plenary sessions devoted to invited papers and dis-

cussion. Additionally there will be a number of workshops each of which will work on a particular topic throughout the conference, using as a basis a working paper prepared by an invited contributor. Suggested topics for workshops include:

- The 'History' laboratory
- Museums and Exhibitions
- The Historical Role of Experiment: Images and Reality
- Physics through the Mass Media
- History of Physics in the In-Service Training of teachers

The cost for full board and accommodation, in single-bedded rooms, will be $30 per day and the conference fee, which will cover both Conference Dinners ($10) and the cost of the Proceedings ($10), will be $75.

For further information write:

Professor F Bevilacqua
Università di Pavia
Centro Studi per la Didattica della Facoltà
di Scienze
Via A Bassi 6
27100 Pavia
Italy.

54 Young Scientist's Competition: Egypt

Under the auspices of the British Council's Direct Teaching of Science Scheme in Egypt a competition has recently been launched, open to students in secondary or technical schools. The **aim** is to encourage young students to undertake a simple, **practically based** scientific investigation or an engineering or agricultural project concerned with their environment and culture; particular emphasis is placed on students doing independent **research**.

Schools are limited to one entry each with a maximum of four persons per project.

The criteria for the projects demand that:

- they do not have to involve high technology equipment, except for measurements associated with research (eg pH metres), but should be based on simple apparatus and/or locally available materials, and that
- they demonstrate some or all of the following:
  a) originality of idea for project
  b) ingenuity in design of experiments or equipment construction
  c) the practical skills of the students
  d) the investigative abilities of the students
  e) the recording and reporting abilities of the students

It has been suggested that suitable projects might include:

- energy conversion devices
- more efficient agricultural implements
- food production from normally arid areas
- devices to aid physically handicapped people
- fresh water from impure sources

Projects can be submitted in Arabic or English and must be the work of the individual or group in its practical aspects and its reporting/recording.

The judging would be in two stages; initially within Governorates to decide on a Governorate winner; Governorate winners would then present their entries for adjudication in Cairo where they would compete against each other for an outright winner.

Prizes will include a sponsored visit to the UK for the winning group and science laboratory equipment for the winning group's school; the runners-up will receive cassette players/recorders plus a selection of cassettes while the runners-up school will also receive science laboratory equipment.

55 A Bibliography on the Readability of Science Materials and the Use of Language: Lesotho

This bibliography has now been produced by David Hitchcock at the National Teacher Training College of Lesotho. For convenience of reference the bibliography has been divided into five sections as follows:

- general readability
- cloze tests
- readability of science textbooks
- teaching materials and language in science lessons
- materials for teachers and teacher-trainers.

Copies are available from either:

David J Hitchcock
c/o The British Council
PO Box 429
Maseru
Lesotho

or:

Consultancies Group
STED
The British Council
10 Spring Gardens
London
SW1A 2BN

56 International Journal of Mathematical Education in Science and Technology: publication

The International Journal exists to provide a medium by which a wide range of experience in mathematical education can be presented, assimilated and eventually adapted to everyday needs in schools, colleges, polytechnics, universities, industry and commerce. Much of the material is at a post-school level, but is none the less of interest to secondary mathematics teachers who enjoy the intellectual stimulation of mathematics, and particularly applications of mathematics, outside their existing experience.

The Journal is published bi-monthly. Volume 13, number 6, November-December 1982, was devoted to a series of articles on mathematical modelling; not all issues have a coherent theme.

Editorial enquiries may be made to the Senior Editor, Professor A C Bajpai, at:

Loughborough University of Technology
Loughborough
Leicestershire
LE11 3TU

Subscription details and sample copies are available on request from the publishers at:

Taylor and Francis (Publishers) Ltd.,
4 John Street
London
WC1N 2ET.

Printed by C. F. Hodgson & Son Ltd., 2nd Floor, Unit 18, Central Trading Estate, Staines, Middlesex